CHEMISTRY in Sri Lanka

Volume 43 No. 02 May 2026

The Tri Annual Publication of the Institute of Chemistry Ceylon

Journey towards Economic Sustainability in Sri Lanka

Role of Chemists

Council of the Institute of Chemistry Ceylon - 2025/2026

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Absent: Mr. H A Senanayake

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The Tri-Annual Publication of the Institute of Chemistry Ceylon

Founded in 1971, Incorporated by Act of Parliament No. 15 of 1972

Successor to the Chemical Society of Ceylon, founded on 25th January 1941

Vol. 43 No. 2 **May 2026**

Theme for the year -

Journey towards economic sustainability in Sri Lanka - Role of Chemists

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Outline of our Institute

The Institute of Chemistry Ceylon is a professional body and a learned society founded in 1971 and incorporated by act of Parliament No. 15 of 1972. It is the successor to the Chemical Society of Ceylon which was founded in 1941. Over 50 years of existence in Sri Lanka makes it the oldest scientific body in the country.

The Institute has been established for the general advancement of the science and practice of Chemistry and for the enhancement of the status of the profession of Chemistry in Sri Lanka. The Institute represents all branches of the profession and its membership is accepted by the government of Sri Lanka (by establishment circular 234 of 9-3-77) for purposes of recruitment and promotion of chemists.

Corporate Membership
Full membership is referred to as corporate membership and consists of two grades: **Fellow (F.I.Chem.C.)** and **Member (M.I.Chem.C.)**

Application for non-corporate membership is entertained for four grades: Associate (former Graduate) (A.I.Chem.C.), Licenciate (L.I.Chem.C.), Technician (Tech.I.Chem.C.) and Affiliate Member.

Revision of Membership Regulation
All Special Degree Chemists can now apply directly to obtain Associate (Graduate) Membership. Three year B. Sc. Graduates (with an acceptable standard of Chemistry) can
(i) directly become Licentiate
(ii) obtain corporate membership in a lesser number of years.

Tech.I.Chem.C.
Those who have passed the DLTC examination or LTCC examination or have obtained equivalent qualification and are engaged in the practice of Chemistry (or chemical sciences) acceptable to the Council are entitled to the designation Tech.I.Chem.C.
Members/Fellows with Membership for Life are entitled to the designation of **Chartered Chemist (C.Chem.)** on establishment of a high level of competence and professionalism in the practice of chemistry and showing their commitment to maintain their expertise.

All corporate members (Members / Fellows) are entitled to vote and become Council/ Committee members whether Chartered Chemists or not.

Membership Applications
Any application for admission to the appropriate class of membership or for transfer should be made on the prescribed form available from the Institute Office.

Current Subscription Rates
Fees should be payed on 1st of July every year and will be in respect of the year commencing from 1st July to 30th June

Fellow	Rs. 2000
Member	Rs. 2000
Associate	Rs. 1500
Licenciate	Rs. 1200
Technician	Rs. 750
Affiliate	Rs. 1200
Membership for Life	Rs. 15000

Entrance Fee

All the grades	Rs. 1000
Processing Fees*	Rs. 500
Processing Fee for Chartered Chemist designation	Rs. 5000
Institutional Members	Rs. 2500

*per application for admission/transfer to any grade

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Dr. A G M J Gunaratna
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Dr. Piyal Ariyananda
Mr. C D R Pathirana
Mr. H A Senanayake

Guest Editorial

Graphene Oxide Based Materials in Organocatalysis: Opportunities and Challenges

Professor Laksiri Weerasinghe

Department of Chemistry, Faculty of Applied Sciences, University of Sri Jayewardenepura

Email: laksiri@sjp.ac.lk

Sri Lanka is one of the few countries with commercially significant deposits of vein graphite, which can exceed 99% carbon purity. The highly crystalline structure and purity of Sri Lankan graphite make it particularly suitable for graphene and graphene oxide (GO) synthesis.

Currently, GO and its analogs represent a versatile class of heterogeneous catalysts for organic synthesis. Their high surface area, tunable surface functionality, environmental compatibility, and reusability make them attractive alternatives to conventional homogeneous catalysts. As shown in Figure 1, GO, sulfonated (S-GO), reduced (r-GO), nitrogen-doped graphene N-GO) and graphene-supported metal nano-composites have shown particularly promising performance in oxidation, condensation, multicomponent, cyclization, and coupling reactions, highlighting their growing importance in synthetic organic chemistry.

GO is an effective catalyst for a wide range of organic reactions due to its unique structural and chemical properties. Its two-dimensional sheet-like structure provides an exceptionally high surface area, allowing efficient adsorption and interaction of reactant molecules. The abundant oxygen containing functional groups, including hydroxyl, epoxy, carbonyl and carboxyl groups, serve as active catalytic sites that can promote acid-catalyzed reactions, hydrogen-bonding interactions, and electron-transfer processes. These functionalities enable GO to activate substrates and stabilize reaction intermediates, thereby enhancing reaction rates and selectivity. Furthermore, GO acts as a heterogeneous catalyst, facilitating easy separation and reuse while minimizing product contamination. Its metal-free nature, low toxicity, environmental compatibility, and ability to operate under mild reaction conditions make it an attractive alternative to conventional homogeneous and metal-based catalysts. Consequently, GO has emerged as a versatile and sustainable catalytic material for numerous organic transformations. As shown in figure 2, Bielawski et al. have reported GO-catalyzed oxidation of aliphatic and benzylic alcohols to their aldehydes and ketones. Various alkynes have also been converted into the corresponding ketones with an excellent yield.

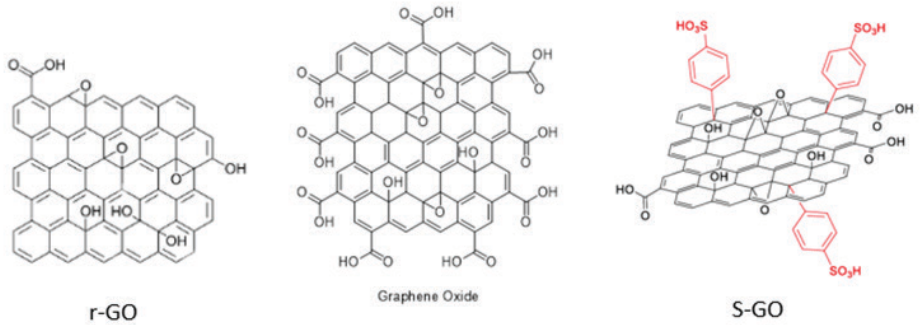


Figure 1: Proposed structures of GO, r-GO and S-GO

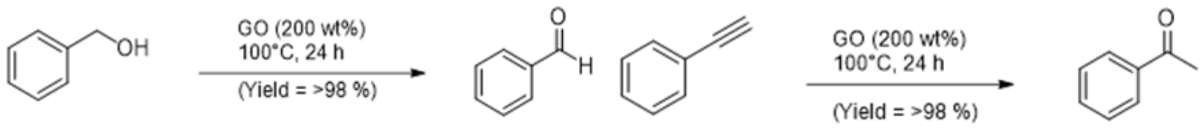
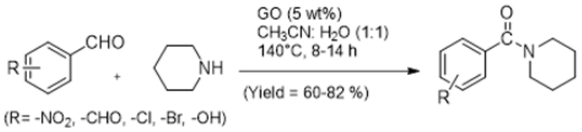


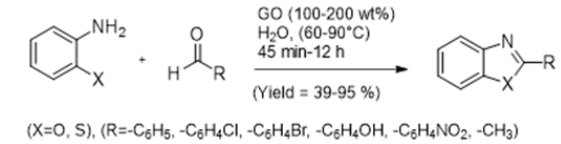
Figure 2: GO catalyze oxidation reactions

Figure 3 summarize some of the key organic reactions reported by various researchers using GO as an efficient catalyst with excellent reusability.

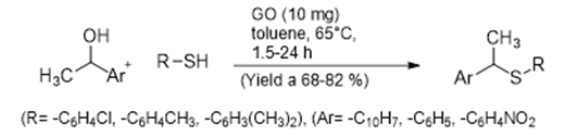
a. Synthesis of amides



b. 2-substituted 1,3-Benzazoles synthesis



c. One-pot synthesis of thioethers



d. Direct Friedel-Crafts Alkylation

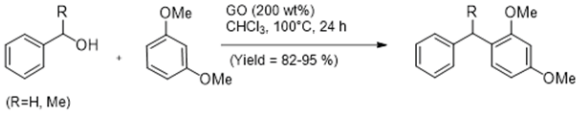


Figure 3

In addition to the developments discussed above, our research group has actively contributed to the application of graphene based materials and their analogs in organic reaction catalysis. We have successfully employed these catalytic systems in several synthetically important transformations, including the Pictet Spengler reaction, Ritter reaction, and the synthesis of oxazolines. These studies have demonstrated the potential of graphene derived catalysts to promote efficient and sustainable organic transformations under environmentally benign conditions. The promising results obtained underscore the versatility of graphene based catalytic platforms and support their continued development as green alternatives to conventional catalytic systems.

Despite the significant advantages of GO and analogs in organic catalysis, several limitations continue to hinder its widespread application. One of the primary challenges is the gradual decline in catalytic activity after repeated recycling cycles, which may result from structural degradation, loss of oxygen-containing functional groups, or surface fouling by reaction intermediates and products. Additionally, the synthesis of GO often exhibits batch to batch variability due to differences in precursor graphite sources, oxidation methods, and processing conditions, leading to inconsistencies in physicochemical properties and catalytic performance. During certain reactions, GO may undergo partial reduction, altering the density and distribution of its functional groups and consequently affecting its catalytic behavior. Furthermore, although GO has demonstrated effectiveness in numerous organic transformations, the detailed catalytic mechanisms remain insufficiently understood for many reactions, limiting the rational design and optimization of GO-based catalysts. Finally, while promising results have been achieved at the laboratory scale, challenges associated with large scale production, process standardization, cost-effectiveness, and long term stability must be addressed before GO catalysts can be widely adopted in industrial organic synthesis.

Future research on GO and its derivatives is increasingly focused on developing advanced catalytic systems with enhanced activity, selectivity, and sustainability. A major area of interest is the design of single atom catalysts supported on graphene based materials, which maximize atomic utilization and provide well-defined active sites for catalytic reactions. The incorporation of heteroatoms such as nitrogen, sulfur, phosphorus, and boron into graphene frameworks is also being extensively explored to tailor electronic properties and create new catalytic functionalities. In addition, graphene derived materials are gaining attention in photocatalytic and electrocatalytic organic synthesis, where their excellent charge transfer characteristics can facilitate energy efficient chemical transformations. Another promising direction involves the utilization of graphene based catalysts for biomass valorization, enabling the conversion of renewable feedstocks into valuable chemicals and fuels. Research is also emphasizing sustainable and solvent free organic transformations in alignment with green chemistry principles, aiming to reduce waste generation and environmental impact. Furthermore, the development of hybrid nanocomposites that combine graphene materials with metal oxides, polymers, and biopolymers is expected to produce multifunctional catalysts

with improved stability, recyclability and catalytic performance, thereby expanding the scope of graphene based catalysis in both academic and industrial applications.

Conclusion and Future Prospects

Graphene oxide and its analogs represent a versatile class of heterogeneous catalysts for organic synthesis. Their high surface area, tunable surface functionality, environmental compatibility and reusability make them attractive alternatives to conventional homogeneous catalysts. Reported works with GO, r-GO, S-GO and graphene-supported metal nanocomposites have shown particularly promising performance in green and sustainable synthetic organic chemistry.

It is worthy to note that Sri Lanka possesses a rare opportunity to transition from exporting raw graphite to exporting high-value graphene-based materials. The combination of high-purity vein graphite, growing nanotechnology and synthetic organic chemistry expertise and industrial initiatives from organizations such as Sri Lanka Institute of Nanotechnology and Ceylon Graphene Technologies positions the country as a potential regional hub not only for graphene production but also advanced carbon nano-materials synthesis for catalysis.

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Professor Laksiri Weerasinghe *is a trained synthetic organic chemist, currently serving as a Professor in chemistry at the Department of Chemistry, University of Sri Jayewardenepura. He obtained his BSc (Honors) degree in Chemistry from the University of Colombo and his PhD degree from Washington State University, USA. He was a Postdoctoral Fellow at University of Montreal, Canada and also served as a senior research scientist at Sri Lanka Institute of Nanotechnology from 2015-2020.*

INSTITUTE OF CHEMISTRY CEYLON
55th Annual Sessions and 85th Anniversary Celebrations 2026

Inauguration of the 55th Annual Sessions, Institute of Chemistry Ceylon

Friday, June 26th 2026 at Auditorium, IChemC Malabe Campus

Programme

8.15 am Arrival of Guests (refreshments will be provided)

9.00 am Ceremonial Procession of Council Members and Past Presidents

9.10 am Lighting of the Oil Lamp & National Anthem

9.25 am Welcome Address & Presidential Address
Professor Emeritus Hema M. K. K. Pathirana
President, Institute of Chemistry Ceylon

10.05 am Presentation of Awards, Prizes and Certificates
- All Island Interschool Chemistry Quiz prizes
- National Chemistry Olympiad prizes
- Graduateship in Chemistry & BSc Hons (Chemical Science) Examinations
  Scholarships, Prizes and Awards
  J N Oleap Fernando Memorial Scholarship
- CCS Awards - Colours
- Inter-University Debating Competition Prizes

11.27 am Address by the Guest of Honour
Ms. Udesha Bopitiya
Managing Director, Lanmic Polymers

11.45 am Presentation of Awards, Prizes and Certificates
Institute of Chemistry Ceylon Awards
- Long Service Award
- Professor M U S Sultanbawa Award for Research in Chemistry – 2025
- Kandiah Award for Applied Chemistry
- CCS Award for Excellence in Research in Chemical Science
- Institute of Chemistry Ceylon Research Awards for Early Career Chemists
- Yeoman Service Award
- Distinguished Service Awards

12.45 pm Address by the Chief Guest
Professor Emeritus A. P. de Silva
Department of Chemistry, Queen's University, Belfast, Ireland

1.25 pm Vote of Thanks
Professor Emeritus A. D. L. Chandani Perera
President Elect, Institute of Chemistry Ceylon

1.30 pm Close of Ceremony

Presidential Address

Journey towards economic sustainability in Sri Lanka - Role of Chemists

Professor Emeritus Hema M. K. K. Pathirana

President, Institute of Chemistry Ceylon

Before addressing this august gathering as the President of Institute of Chemistry, I would like to pay tribute to the late Prof. J.N.O. Fernando for his visionary leadership and for laying out the foundation that enabled the Institute of Chemistry Ceylon to achieve its current position.

It has been a privilege for me to serve as the 89th President of the Institute of Chemistry Ceylon during the council year of 2025/2026.

Institute of Chemistry Ceylon was established in 1971 as the successor to the Chemical Society of Ceylon for general advancement and practice of chemistry. It was incorporated by the Act of parliament No. 15 of 1972. It is a Professional organization and the education arm of the College of Chemical Sciences (CCS) was established in 2021 to conduct all the educational activities of the institute. An annually elected Council serve as the governing body of the Institute and a full time Dean appointed by the Council serves as the Chief administrator of the CCS. Annual activities of the institute are carried out by statutory committees and sub-committees.

The Institute offers the BSc Hons (Chemical Science) degree programme and the Graduateship in Chemistry programme. It is recognized by the Ministry of Education and Higher Education as a degree-awarding institution, and the BSc Hons (Chemical Science) degree programme is accredited by the Ministry. Both the BSc Hons (Chemical Science) and the Graduateship in Chemistry programmes are accredited by the Royal Society of Chemistry, UK. In addition, the Institute offers Diploma in Laboratory Technology (DLT) and Medical Laboratory Technology (MLT) programmes.

Following are the major achievements during the period I served as the President.

Institutional review for the next five years was conducted successfully. Site visit by the reviewers for the Program Review was completed and awaiting their report. Institute received the degree awarding status to offer the proposed BSc Hons in Medical Laboratory Science (MLS) programme, subject to the approval of the CMCC. Preparation of the curriculum for the proposed BSc Hons in Polymer Science and Technology programme is completed and now under review by an expert. The revised curricula of the BSc (Hons) in Chemical Science and the Graduateship in Chemistry (GIC) programmes are now being offered under strict monitoring and quality assurance measures.

Two new Senior lecturers were recruited. Full time two Visiting Professor Positions were filled by appointing a Senior Professor and a Professor from state universities, who are on sabbatical leave. The convocation-2025 December was postponed because of the Ditwah cyclone and held in January 2026.

Certain measures were introduced to upgrade the financial division of the institute by creating a Senior Accountant position and by appointing a qualified and experienced Senior Accountant. An audit committee and an investment committee were also appointed.

Limited physical resources available for students were expanded successfully with the opening of the Malabe campus of the Institute of Chemistry. Lecture rooms with modern facilities, well-equipped laboratories, a spacious library, a canteen, ample parking facilities, a shuttle service, and, most importantly, a campus environment conducive to learning are available for both students and staff. An Engineer was appointed to handle the building project issues and also to serve as the Acting Assistant

Registrar to Malabe Campus. A Quantity Surveyor was appointed as a consultant to handle matters related to the building project. The soft opening ceremony of the Malabe Campus was held in October 2025. I would like to thank all the past Presidents, members of the Council and our staff for their involvement in various ways to make this project a success.

During this Council year usual activities of the institute, CCS and students for popularization of chemistry, dissemination of knowledge, skills development activities, social activities, religious and cultural activities, recreation and sports, JNO Fernando memorial ceremony, etc. were successfully continued by relevant committees and subcommittees. Full or partial funding was given for such activities by the institute. A few examples are interuniversity debate competition, inter-level debate competition, Olympiad competitions, magic shows, seminars by eminent chemists, practical classes and lectures on special topics for A/L students and teachers, religious and cultural activities, aura, sports activities, social activities, Prof. JNO memorial ceremony and women's day celebration. Expenses allocated for the annual trip for the staff was donated by them to the victims of the Ditwah disaster.

The theme for the Council year 2025/2926 is "Journey towards economic sustainability in Sri Lanka - Role of Chemists". The reason for selecting this theme is, since 2022, Sri Lanka is experiencing an unprecedented economic crisis and as chemists we have to play a major role to overcome this problem to a certain extent. During the last curriculum revision, special attention was given to produce graduates having such skills and knowledge.

Sri Lanka should have an adequate number of graduates in Chemistry having the required skills and knowledge to involve in this process. Institute of Chemistry Ceylon, shoulders this responsibility successfully. This year our intake is 295 students and last year it was 301. At the last convocation 195 students graduated while it was 155 previous year.

At present Sri Lanka is not using the available natural resources in an effective manner. The reason is, lack of advanced research and innovations on value addition to our natural resources to manufacture new materials and develop products and knowhow to increase the efficiency of those processes. For this task, creative thinking and using already available understanding in basic chemistry in an effective manner are essential. When achieving the above goals, it is necessary to give serious attention to fundamentals of Green chemistry and Cleaner production in order to protect the environment and sustainability of the production process. To improve the enthusiasm in Chemical innovations among the young generations, one session in the Annual Sessions is dedicated to an Interuniversity Competition on Chemical Innovation". It has also enhanced the institute-industry collaboration.

Sri Lanka is blessed with mineral resources, plenty of fresh water, medicinal plants, spices. sunlight throughout the year, etc. Instead of exporting raw natural resources at cheap rates, it is necessary to utilize those resources to manufacture materials and for product development for the export market. Attention should be given at the same time on value addition and quality controlling. Introduction of Mineral-based industries; pharmaceutical industry based on herbal plants; electricity using solar energy, wind power, etc.; food industry for export market using fresh water, tropical fruits, fish, etc.; use of organic waste for biofuel; are a few examples. Research applicable and development of relevant materials for such industries would also help to improve the economy.

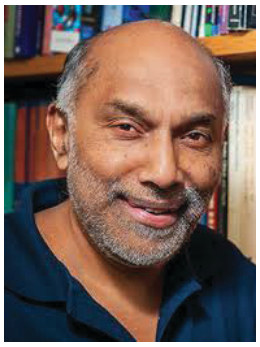
My research fields related to the above matter are Material Chemistry, Organometallic Chemistry, Green Chemistry and Environmental Chemistry. A few examples for my involvements are, development and characterization of thin film semiconductors; development of degradation methods for persistent pesticides; production of fish oil and bio-diesel from fish waste; isolation of apatite from fish bones; and preparation of test kits.

I take this opportunity to sincerely thank all those who helped me to successfully handle all my responsibilities as the President of Institute of Chemistry Ceylon 2025/2026 during my tenure and to successfully organize the annual sessions - 2026.

Professor Emeritus Hema M. K. K. Pathirana *is a distinguished Sri Lankan chemist and academic, formerly attached to the Department of Chemistry at the University of Ruhuna. She has made significant contributions to chemical education, research, and professional leadership, with expertise in inorganic, environmental, and green chemistry. She is a Fellow of the Institute of Chemistry Ceylon and currently serves as its President (2025/2026).*

Message from the Chief Guest

Professor Emeritus A. P. de Silva



I am delighted, and feel greatly honoured, to participate in the 55th annual sessions of the Institute of Chemistry, Ceylon, on the theme 'Chemical Research and Innovation for Economic Prosperity' under the Presidency of Professor Emeritus Hema Pathirana of the University of Ruhuna. I am also looking forward to joining in the session on 'Chemistry-based Innovations' where undergraduates, postgraduates and senior chemists from academia and industry will be present. I note that these topics fit nicely within the main theme of the year of the Institute of Chemistry, Ceylon, which is 'Journey Towards Economic Sustainability of Sri Lanka - Role of Chemists'. I look forward to meeting friends old and new, and to find out about the latest developments in the Sri Lanka Chemistry community. I wish the 55th annual sessions all success. May they be a forum for exchange of ideas which will lead to mutual benefit for all attendees.

Best wishes

A. P. de Silva
Professor Emeritus,
School of Chemistry and Chemical Engineering,
Queen's University Belfast, Northern Ireland

Message from the Guest of Honour

Ms. Udesha Bopitiya

It is a great privilege and honour to participate in this event as the Guest of Honour.

As a proud graduate of Institute of Chemistry Ceylon, I deeply appreciate the role that leading academic institutions play in advancing scientific knowledge, fostering innovation, and developing future leaders. Through its commitment to excellence in education and research, Institute of Chemistry Ceylon, has made a significant contribution to the global scientific community.

As chemistry graduates transition into industry, they have an important responsibility to apply their knowledge and skills to drive innovation, enhance productivity, and contribute to economic growth and sustainable development.

I commend the organizers for providing a platform that promotes knowledge sharing and collaboration between academia and industry, and I wish this event every success.

Best Wishes,

Ms. Udesha Bopitiya
Group Director (Technical)
Managing Director – LANMIC Polymers

INSTITUTE OF CHEMISTRY CEYLON
55th Annual Sessions and
85th Anniversary Celebrations 2026

Our Sponsors

Distinguished Service Award – 2026

Professor Janitha A Liyanage

The Institute of Chemistry Ceylon is pleased to recognize **Professor Janitha Abeywickrema Liyanage** on the occasion of receiving the Distinguished Service Award, in appreciation of her exceptional contributions to the advancement of chemical sciences, higher education, research, and professional leadership in Sri Lanka.

A distinguished academic and researcher, Professor Liyanage has dedicated more than three decades to teaching, scientific inquiry, and the development of chemistry education. Her research contributions in analytical chemistry, environmental chemistry, chemical speciation, and public health have significantly enriched the scientific landscape of Sri Lanka and have earned both national and international recognition. Through her extensive scholarly output and mentorship of numerous undergraduate and postgraduate students, she has inspired generations of young scientists and researchers.

Professor Liyanage has also rendered invaluable service to the nation through her leadership in higher education and public administration. Her appointments as Vice Chairperson of the University Grants Commission, Vice Chancellor of the Gampaha Wickramarachchi University of Indigenous Medicine, and Ambassador of Sri Lanka to the Russian Federation and several neighbouring countries stand as testimony to her exceptional leadership and commitment to national development.

Her association with the Institute of Chemistry Ceylon spans many years and reflects a remarkable record of dedicated service. Having served the Institute in numerous capacities, including Editor, Secretary, Council Member, Vice President, President, and Dean of the College of Chemical Sciences, she has played a pivotal role in strengthening professional chemical education, promoting research excellence, and enhancing the standing of the Institute both nationally and internationally.

A Fellow of the Institute of Chemistry Ceylon and the Royal Society of Chemistry, Professor Liyanage exemplifies the values of scholarship, integrity, leadership, and service. Her distinguished career has brought honour to the chemical profession and has contributed significantly to the advancement of science and society.

Distinguished Service Award – 2026

Professor Emeritus Ramanee D Wijesekera

It is with great respect and gratitude that we recognize **Professor Emeritus Ramanee D. Wijesekera** for her exemplary service to the Institute of Chemistry Ceylon over the past 25 years. Her unwavering commitment has been evident through her extensive involvement in numerous committees and leadership roles. She has served on the Council since 2005, Hony. Joint Secretary, Institute of Chemistry Ceylon (2009/2010) and as the Dean of the College of Chemical Sciences (2021/2022).

She has also significantly contributed to finance, student affairs, international relations, publications, and editorial work, which is evident from her services to many committees in various capacities as detailed below. Chairperson Awards Committee (2023/2024 and 2018/2019); Member, Awards Committee (2024/2025, 2020 -2023, 2011/2012 and 2009/2010); Chairperson, Academic Board, of the Institute of Chemistry (2021/2022); Member, Academic Board of the College of Chemical Sciences (2019/2020, 2018/2019, 2017/2018, 2016/2017, 2015/2016, 2014/2015, 2011/2012 & 2009/2010); Coopted member (2012/2013 & 2013/2014); Member, Monograph Committee (2006 - to date); Chairperson, Library Committee (2024/2025); Secretary, International Relations (2012 -2018, and 2023 to date); Chairperson, Academic Board Finance, (2021/2022); Chairperson, Student Finance Management Committee (2021/2022); Member, Salary & Cadre Committee (2021/2022); Member, Building Committee (2021/2022); Member, Social Affairs Committee (2018/2019, 2017/2018); Member, Editorial & Publicity Committee (2017/2018, 2016/2017, 2009/2010, 2008/2009); Secretary, House, Finance & Membership Committee (2009/2010); Member, Training Seminars/ Workshops Committee (2009/2010); Hony. Assistant Editor (2007/2008); Editor, Book of Abstracts, Chemtech 2007 International Conference (ISSN 1800-2994); Editor, Proceedings of Chemtech 2007 International Conference (ISSN 1800-3745) are the committees Prof. Wijesekera served over the past 25 years.

Beyond her service to the Institute, Professor Wijesekera concluded a distinguished academic career as a Senior Professor at the Department of Chemistry, University of Colombo, retiring in 2024 after 40 years of service. Her tireless contributions have left an indelible mark on both the Institute and the broader chemical sciences community.

Yeoman Service Award – 2026

Professor H I C de Silva

Professor H. Ireshika C. De Silva is a Professor at the Department of Chemistry, University of Colombo. Professor De Silva's academic foundations were laid at the University of Colombo, where she graduated with Second Class Honours (Upper Division) in Chemistry. She obtained her PhD in Organic Chemistry from Mississippi State University, USA in 2012, followed by postdoctoral research at the University of Alabama at Birmingham, USA. Professor De Silva is a recipient of several prestigious international fellowships and grants, including the Russell and Susan Boyd Visiting Fellowship at Dalhousie University, Canada, the TWAS-UNESCO Associateship Grant, and a Fellowship from the Organization for the Prohibition of Chemical Weapons.

Her association with the Institute of Chemistry Ceylon began in 2013, when she joined the College of Chemical Sciences as a full-time academic. Promoted to Senior Lecturer in 2014, she made a significant contribution to the College's education programme during her tenure. She continued to serve the College as a Visiting Lecturer from 2015 to 2020, and as a member of the Academic Board in the 2020/2021, 2024/2025, and 2025/2026 Council years.

Professor De Silva has served on the Council of the Institute since 2014. She has held a wide range of honorary positions with consistent dedication, including Honorary Assistant Editor (2014/2015, 2015/2016, 2021/2022 and 2022/2023), Honorary Editor (2016/2017 and 2017/2018), Honorary Joint Secretary (2018/2019 and 2019/2020), and Chairperson of the Awards Committee (2024/2025 and 2025/2026). She has been a member of the Women Chemists Committee of the Institute since its inception.

She has devoted herself not only to her academic career but to the broader mission of advancing chemistry. As a founding member of the Chemistry Olympiad Sri Lanka Committee, established in 2017 under the Council of the Institute of Chemistry Ceylon, she served as Secretary till 2021 and has led it as Chairperson since then. She mentored the national team from Sri Lanka's first participation in the International Chemistry Olympiad in 2020 through 2023. Under her leadership, Sri Lanka has consistently secured medals at both the International Chemistry Olympiads and the International Mendeleev Chemistry Olympiads, bringing distinction to the Institute and inspiring a new generation of chemists.

Professor De Silva's service to the chemistry community extends to the international arena as well. Appointed to the Executive Board of the Federation of Commonwealth Chemical Sciences Societies (Commonwealth Chemistry) in 2024 and serving on its Early Career Networking Committee, she brings Sri Lanka's voice and the Institute's values to a global platform. As an Executive Board member, she helps set the Federation's strategic direction and governance while driving greater representation and opportunities for early-career chemists across the Commonwealth.

Professor H. Ireshika C. De Silva will be awarded the Yeoman Service Award at the 55th Annual Sessions in recognition of the Yeoman services rendered in an honorary capacity, thereby contributing to the educational programmes of the Institute in a noteworthy manner.

Institute of Chemistry Ceylon Research Award for Early Career Chemists

Professor Medha J. Gunaratna

Professor Medha J. Gunaratna is a Professor in the Department of Chemistry at the University of Kelaniya, whose outstanding contributions to research in the chemical sciences have earned her the prestigious Institute of Chemistry Ceylon Research Award for Early Career Chemists 2026.

Prof. Gunaratna obtained her PhD in Chemistry from Kansas State University, USA, in 2017, under the supervision of University Distinguished Professor Duy H. Hua. Her doctoral research focused on the design, synthesis, and biological evaluation of piperidines and CGRP peptides, as well as the synthesis of substituted isoindolinones as luciferase inhibitors. She earned her BSc (Honours) in Chemical Biology from the University of Colombo in 2011 and her Graduateship in Chemistry from the Institute of Chemistry Ceylon in 2010.

Her research interests focus on the synthesis and bioevaluation of small organic molecules, the isolation and characterization of novel bioactive natural products, and the development of nano-delivery systems for enhanced therapeutic applications. Her scholarly output includes numerous peer-reviewed publications in internationally recognized journals, including those ranked in Q1 and Q2 categories. Prof. Gunaratna's research excellence has been recognized through several prestigious awards. She was honoured with the Vice Chancellor's Award for Outstanding Young Researcher in the Faculty of Science, University of Kelaniya, receiving First Place in 2024 and a Merit Award in 2025. She was also awarded the Poster Prize in the Health and Wellbeing Theme at the 2nd Commonwealth Chemistry Posters event in 2021 for her work on novel urease inhibitors targeting *Helicobacter pylori*.

Beyond her research accomplishments, she has made invaluable contributions as Secretary of the International Conference on Applied and Pure Sciences (ICAPS 2023), Co-Chair of the ICAPS Publication Committee in 2024, and a member of the ICAPS Editorial Board for multiple years. She has also contributed to the organization of the First and Second International Conferences on Frontiers in Chemical Technology as a member of the organizing committee. As a dedicated mentor, she has successfully supervised a number of undergraduate and postgraduate students, nurturing the next generation of researchers and scholars.

Prof. Gunaratna has been a Fellow of the Institute of Chemistry Ceylon since 2025, a Chartered Chemist since 2021, an Affiliate Member of IUPAC since 2024, and a Life Member of the Sri Lanka Association for the Advancement of Science (SLAAS), the Organization for Women in Science for the Developing World (OWSD), and the Young Scientists Forum (YSF). She has served as Honorary Joint Secretary of the Institute of Chemistry Ceylon (2021/22, 23/24, and 24/25), Secretary of Section E2 (Chemical Sciences), SLAAS (2024), and Secretary of the Environment Committee of SLAAS (2023).

Through her dedication, leadership, and intellectual contributions, Professor Medha J. Gunaratna serves as an inspiration to her peers and students alike, setting a benchmark for excellence in research and academia.

Institute of Chemistry Ceylon Research Award for Early Career Chemists

Dr. Chandima J. Narangoda

Dr. Chandima J. Narangoda is a distinguished scientist, educator, and innovator who serves as a Senior Lecturer in the Department of Chemistry and Director of the Center for Advanced Material Research (CAMR) at the Faculty of Applied Sciences (FAS), University of Sri Jayewardenepura. He obtained his Ph.D. in Chemistry from Clemson University, USA, after graduating with First Class Honors in Chemistry from the University of Sri Jayewardenepura. His research expertise spans advanced organic synthesis, medicinal chemistry, methodology development, materials, sensors, polymers, rubber technology, paint and coatings, nanomaterials, and sustainable materials development.

Dr. Narangoda has published extensively in internationally recognized journals and is the inventor of multiple patented technologies in both the United States and Sri Lanka. He has received numerous research awards and international recognition for his contributions to science and innovation. In addition to his academic achievements, he provides part-time consultancy services to leading companies including MAS Innovation, DSL Lanka (Pvt) Ltd., Access Engineering PLC, OTR Engineered Solutions Lanka, and other industries in the fields of textiles, rubber, polymers, paints and coatings, composites, and advanced materials. His work continues to bridge cutting-edge scientific research with practical industrial solutions, contributing significantly to technological advancement and sustainable innovation in Sri Lanka and beyond.

CHEMISTRY IN SRI LANKA

Chemistry in Sri Lanka is a tri-annual publication of the Institute of Chemistry Ceylon and is published in January, May and September of each year. It is circulated among the members of the Institute of Chemistry and students of the Graduateship/DLTC course and libraries. The publication has a wide circulation and more than 500 copies are published. Award winning lectures, abstracts of communications to be presented at the annual sessions, review papers, activities of the institute, membership news are some of the items included in the magazine.

The editor invites from the membership the following items for publication in the next issue of the Chemistry in Sri Lanka which is due to be released in September 2026.

- *Personal news of the members*
- *Brief articles of topical interests*
- *Forthcoming conferences, seminars and workshops*
- *Latest text books and monographs of interest to chemists*

All publications will be subjected to approval of the 'Editorial and Publicity Committee' and the Council of the Institute of Chemistry Ceylon.

Further, prospective career opportunities for chemists, could be advertised in Chemistry in Sri Lanka at a nominal payment. The editor in charge welcomes suggestions from the members for improvement of the publication.

CCS Researcher of the Year Award

Awarded annually to a full time internal academic of the College of Chemical Sciences, Institute of Chemistry Ceylon, for the most outstanding contributions to scientific research in the course of a particular year. The criteria for the evaluation of the awardee includes peer-reviewed scientific publications, including research articles, review articles, and book chapters, conference presentations and Web of Science citations garnered throughout the course of the year.

CCS Researcher of the Year Award - 2026

Dr. Sameera Ranmal Gunatilake obtained the Graduateship in Chemistry qualification with First Class Honours from the College of Chemical Sciences, Institute of Chemistry Ceylon, in 2007. He subsequently earned his PhD in Analytical Chemistry from Mississippi State University, USA.

Dr. Gunatilake currently serves as a Senior Lecturer at the College of Chemical Sciences, Institute of Chemistry Ceylon. He is a recipient of the India Science and Research Fellowship and has received several prestigious research awards, including the Presidential Award for Scientific Publications, Sri Lanka, the Ramakrishna Memorial Award of the Institute of Chemistry Ceylon, the Chemosphere Journal Award for a highly cited review article, and the CCS Researcher of the Year Award.

Dr. Gunatilake has authored 34 peer-reviewed publications, which have received over 1,950 citations in the Web of Science database, resulting in an h-index of 20. He has secured four competitive research grants, including two grants from the Institute of Chemistry Ceylon in 2016 and 2021, and has supervised two postgraduate research students.

His research focuses on the development of engineered biomass-derived carbonaceous materials for environmental remediation and sustainable agricultural applications.

Long Service Award - 2026

Mr. W. Ravindra R. Perera joined the Institute of Chemistry Ceylon in 2006, and was promoted to the post of laboratory attendant in 2009. Since 2017, he has been serving as a laboratory assistant at the Institute, in which he continues his duties with diligence and discipline.

In appreciation of over 20 years of devoted service to the Institute of Chemistry Ceylon, Mr. Ravindra Perera is awarded with the Long Service Award..

Kandiah Memorial Awards

Awarded for the best research contribution in Chemistry carried out by a postgraduate student registered for a postgraduate degree by either course work or/ and research at a Higher Educational Institute in Sri Lanka and for work carried out in Sri Lanka, with the exception of special analysis that cannot be done in the country. Such results should be less than 20% of the findings from the work. Sandwich programs carried out partially abroad do not qualify for the award.

- **Kandiah Award for Basic Chemistry**
  For research predominately in basic Chemistry (Organic, Inorganic, Physical, and Analytical).
- **Kandiah Award for Applied Chemistry**
  For research in Chemistry related areas such as polymer, food, biochemistry, biotechnology, where interdisciplinary research is involved and provided that chemistry has a central role and comprises at least 50% of the content.
- **Kandiah Memorial Graduateship Award**
  For the best piece of research in the Chemical Sciences carried out by a Graduate Chemist of the College of Chemical Sciences/Institute of Chemistry Ceylon registered with a Higher Education Institute for a Postgraduate Degree.

Kandiah Memorial Award for Applied Chemistry - 2026

Ms. Saranya Selvaraj Lavan graduated with a Bachelor of Science degree in Biotechnology, Microbiology, and Biochemistry from the University of Mysore, India. She subsequently obtained her Master of Science degree in Biotechnology from the University of Peradeniya, Sri Lanka.

In 2025, she earned her Master of Philosophy (MPhil) degree in Chemistry from the University of Sri Jayewardenepura, Sri Lanka, under the main supervision of Prof. Laksiri Weerasinghe. Her MPhil research was supported by the Faculty Research Grant of the University of Sri Jayewardenepura and focused on the project titled "Evaluation of Naturally Derived Peptides for Selective Anticancer and Antibacterial Therapy."

Her research has contributed to several publications in SCI-indexed journals and has been presented at numerous national and international scientific conferences. Her research interests include natural product chemistry, bioactive peptides, anticancer therapeutics, antimicrobial agents, and biotechnology-driven approaches for drug discovery.

Abstract of Kandiah Memorial Award for Applied Chemistry - 2026

Evaluation of Naturally Derived Peptides for Selective Anticancer Therapy

Saranya Selvaraj Lavan[1], Inoka Perera[2], Tharindu Senaphathi[3] and Laksiri Weerasinghe[3]*

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Antimicrobial peptides (AMPs) are small, sequenced peptides that are abundant in nature and, act as an inhibitor against bacteria. Recently AMPs have been employed as cancer therapeutic agents and are called anticancer peptides (ACP), due to the biocompatibility and high specificity and selectivity between cancerous and non-cancerous cells. Nevertheless, pre-clinical screenings for such drugs are often costly and time-consuming to report such peptide drugs. To address these challenges, more efficient techniques have been developed, such as in silico methods, which are considered promising alternatives. The Gomesin and XLAsp-P2 peptides were selected for further studies as an ACP. A naturally occurring peptide called XLAsp-P2 was extracted from Xenopus laevis skin tissues, while Gomesin is a natural AMP derived from the *Acanthoscurria gomesiana* Brazilian spider. The Akt1 protein, known to play a pivotal role in cancer cell growth signaling, was identified as the target protein using the PharmMapper server. The Gomesin peptide's homology structure was retrieved from the Protein Data Bank (PDB) on the RCSB server, and XLAsp-P2 was modelled with PEP-FOLD. The homology modeling of the Akt1 protein was conducted via the CHARMM-Gui web server using data from the UniProt database. Studies incorporating molecular docking were conducted using HADDOCK to determine the interaction between peptide inhibitors and Akt1. The results indicated that the binding regions of the peptide-protein complex are probably inhibited through allosteric inhibition. The dynamic motion behavior of the peptide-Akt1 complex was analyzed over 100 nanoseconds employing the NAMD web server. The findings demonstrated that the XLAsp-P2 exhibited strong affinity and stability, suggesting its potential to effectively disrupt cancer growth signaling pathways. In parallel, wound healing remains a complex biological process involving a series of intricate molecular and cellular events. This study focuses on the incorpation of electrospun cellulose acetate (CA) nanofibers loaded with XLAsp-P2 that hold great potential as a therapeutic agent for enhanced wound healing. The XLAsp-P2-loaded CA nanofibers were synthesized with three different loading percentages: 0.1 %, 0.2 %, and 0.3 % w/w. The nanofibers were characterized with Scanning electron microscopy (SEM) and Fourier-transform infrared spectroscopy (FT-IR) and evaluated for their antimicrobial potential using MTT assay and Agar overlay methods. In the in vitro release study during the 24 hrs, 87 % of the peptide was released which was approximately 5.2 mg; which more precisely matched the Higuchi square root model, according to the in vitro release research. The Agar overlay method exhibited, where *Escherichia coli* (ATCC 25922) and *Pseudomonas aeruginosa* (ATCC 27853) had moderate susceptibility with inhibition zones of 17.66 ± 0.38 mm and 17.44 ± 0.38 mm, respectively. In contrast, Staphylococcus aureus (ATCC 25923) and Bacillus cereus (ATCC 11778) showed promising responses with inhibition zones of 19.89 ± 0.69 mm and 23.00 ± 0.33 mm, respectively. Graphene oxide (GO) incorporated with XLAsp-P2 was conducted for MTS assay as anticancer analysis for preliminary understanding. Meanwhile, peptide incorporated CA mat and GO holds great promise as an effective platform for delivering therapeutic peptides, offering a novel approach to both cancer therapy and wound healing.

Keywords:

Anticancer peptide, AKT1, Molecular docking, MD simulation, wound healing

Professor M. U. S. Sultanbawa Award for Research in Chemistry

Awarded for the best research paper presented at the Annual Sessions of the Institute of Chemistry Ceylon, for the unique, distinguished and significant contribution made to the cause of Science, Chemistry, Education and Research in Sri Lanka.

Professor M. U. S. Sultanbawa Award for Research in Chemistry - 2025

Pasindu Dilshan Perera is a researcher specializing in nanotechnology, computational chemistry, and bio-mediated nanoparticles His undergraduate research, titled "Chitosan-Stabilized Silver Nanoparticles: Molecular Dynamic Simulation on the Stability and Interactive Toxicity with Cd in an *In Vivo* Model, *Moina Macrocopa*," was conducted under the supervision of Prof. Suranga Wickramarachchi and co-supervision of Prof. Channa De Silva, Dr. Jayangika Dahanayake and Dr. Thilomi Samarakoon. His work focuses on the synthesis and characterization of chitosan-stabilized silver nanoparticles, utilizing advanced computational molecular dynamics simulations and molecular docking to evaluate their environmental stability and interactive toxicity.

Pasindu holds a Bachelor of Science Honors Degree in Chemistry with a Second Class Upper Division from the University of Kelaniya, Sri Lanka. His research contributions include peer-reviewed journal publications, national and international conference presentations including the 20th Asian Chemical Congress (ASIACHEM2025) and leadership roles such as serving as the President of the Chemical Society and Vice-President Public Relations of the Gavel Club. He has also been involved in interdisciplinary projects exploring the development of optimized formulations for synthetic clay during an industrial training stint with The Pen Factory (Pvt) Ltd.

He currently serves as a Teaching Assistant in the Department of Chemistry at the University of Kelaniya, Sri Lanka, where he manages core organic, inorganic, physical, and biochemistry laboratory classes while coordinating activities as the assistant coordinator of the National Glass Blowing Center. He has been selected to pursue his Ph.D. in Chemistry at Louisiana State University (LSU), USA, beginning with the Fall 2026 intake.

Professor M. U. S. Sultanbawa Award for Research in Chemistry - 2025

Chitosan-Stabilized Silver Nanoparticles: Molecular Dynamics Simulation on the Stability and *In-Vivo* Interactive Toxicity with Cadmium on an Aquatic Model *Moina macrocopa*

D. Pasindu Dilshan Perera[1], Jayangika Dahanayake[1], Thilomi Samarakoon[2], Suranga Wickramarachchi[1]*

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The rapid rise of nanotechnology has resulted in minute particles, yet powerful such as silver nanoparticles (AgNPs) into countless products, from medical devices to household goods. These metallic specks, celebrated for their potent antimicrobial and catalytic traits, are driving innovation. Yet, as they move from the lab to market, a critical question remains: What happens when these engineered materials enter to environment, especially when they encounter other common pollutants. Recent studies suggest that AgNPs can undergo physicochemical transformations in the presence of other pollutants, such as heavy metals, altering their behavior and toxicity. Cadmium (Cd), a well-known toxic heavy metal, is frequently found in industrial effluents and can co-exist with AgNPs in aquatic habitats. The interaction between these two contaminants can result in synergistic or additive toxic effects, which remain poorly understood. Addressing this knowledge gap requires a multidisciplinary approach that combines material science, computational chemistry, and environmental toxicology.

A major hurdle for using nanoparticles is their instability. In water, unprotected AgNPs tend to clump together, which can drastically change their properties and environmental behavior. Our research sought a sustainable solution to address this issue. Chitosan, a natural, renewable polymer derived from crustacean shells. AgNPs were successfully synthesized *via* a simple, heated reaction. During AgNP synthesis, chitosan plays a dual role: it acts as a green chemical reductant, converting silver ions (Ag^+) into metallic silver (Ag0), and, most importantly, as a stabilizing cap to synthesized AgNPs. Chitosan polymer, rich in amine and hydroxyl groups, wraps tightly around the silver, creating a robust shield that prevents the particles from collapsing.

Analytical tests confirmed the formation of the metallic core and secured the presence of the chitosan coating, revealing uniformly dispersed, stable nanospheres. In order to truly validate the effectiveness of the chitosan shield, we moved beyond the physical laboratory into the realm of computational chemistry. This is where Molecular Dynamics (MD) simulations provided atomic-level insights into the system's stability.

To model this accurately the CHARMM force field (Chemistry at Harvard Macromolecular Mechanics) was used with the GROMACS software. A force field is essentially the mathematical blueprint used to calculate the energy and forces acting on every atom in the simulation, allowing us to predict their movement over time. In the CHARMM model, the total energy of the system is the sum of bonded interactions (like the spring-like forces holding the chitosan molecule together) and non-bonded interactions (like the attractions and repulsions between different molecules). The non-bonded terms, which include van der Waals forces and electrostatic forces (based on atomic charges), are critical for modeling the securing interaction between the chitosan and the silver surface.

The MD simulations, powered by this precise force field, confirmed that the CS-AgNPs remained structurally sound and highly stable over the entire simulation period. This demonstrated that the non-covalent, hydrogen-bonding forces exerted by the chitosan are highly effective in maintaining the nanoparticle's integrity in an aqueous setting, reinforcing the synthesis success computationally.

The final, and most crucial, step was to test the environmental impact of AgNPs when released to water bodies. *Moina macrocopa*, a common freshwater crustacean was chosen as the model organism for *in-vivo* toxicity assessment. The individual effects of CS-AgNPs and heavy metal toxin Cadmium (Cd), and their combined presence on *Moina macrocopa* were assessed.

As anticipated, CS-AgNPs exhibited only mild toxicity to *Moina macrocopa*, suggesting the protective polymer coating was effective. Cadmium, a well-known pollutant, caused significant harm even at low concentrations. However, the results from the combined exposure were alarming: the toxicity was synergistic. The organisms suffered a far steeper decline in survival, growth, and reproduction when exposed to both contaminants than would be expected from simply adding their individual effects. This synergistic effect suggests that the chitosan, while stabilizing the silver core, might also be complexing with the cadmium ions. This new interaction could potentially enhance the uptake of the highly toxic metal species by the *Moina macrocopa*, highlighting a hidden hazard in complex aquatic systems.

This research stands as a powerful demonstration of the need to merge experimental chemistry with advanced computational prediction. We have successfully proven that chitosan is an excellent green stabilizer for silver nanoparticles. However, the discovery of enhanced toxicity in the presence of cadmium serves as a vital environmental warning.

Moving forward, the development of nanotechnology must be guided by this holistic approach. We must evaluate nanomaterials not in isolated, pristine laboratory conditions, but under environmentally realistic scenario where interactions with co-existing pollutants like heavy metals are the norm. This work provides a robust framework, accelerating the rational design of future materials that balance high performance with necessary environmental safety.

55th Annual Sessions & 85th Anniversary Celebrations of the Institute of Chemistry Ceylon

Theme Seminar on

Chemical Research and Innovations for Economic Prosperity

Date: Saturday, 27th June 2026 ***Time:*** 8.15 am - 12.15 pm

Venue: Institute of Chemistry Ceylon – Malabe Campus,
152A, Nawa Pubudu Kreedangana Mawatha, IT Park, Halbarawa, Malabe

Programme

8.15 am - 9.00 am	Registration and Refreshments
9.00 am - 9.10 am	Welcome Address **Prof. Emeritus Hema M.K.K. Pathirana** *President, Institute of Chemistry Ceylon*
9.10 am -9.50 am	Natural Resources of Sri Lanka for Economic Upliftment **Prof. Emeritus O. A. Illeperuma** *Professor Emeritus, Department of Chemistry, University of Peradeniya*
9.50 am -10.30 am	The Invisible Backbone: How National Quality Infrastructure Powers Sri Lanka's Agri-Food Trade **Dr. A. M. Mubarak** *Former Director/CEO, Industrial Technology Institute, Sri Lanka*
10.30 am - 11.10 am	Scaling Molecules for National Economic Impact **Prof. Ajith de Alwis** *Professor, Department of Chemical and Process Engineering, University of Moratuwa*
11.10 am - 11.50 am	From the Research Bench to the Marketplace: Lessons in Innovation, Commercialization, and Economic Development **Prof. K. M. Nalin de Silva** *Professor, Department of Chemistry, University of Colombo*
11.50 am - 12.30 pm	Harnessing Sri Lanka's Mineral Wealth for Industrial and Economic Development **Ms. Udesha Bopitiya** *Managing Director, Lanmic Polymers*
12.30 pm - 12.45 pm	Vote of Thanks **Dr. Dakshika Wanniarachchi** *Honorary Joint Secretary, Institute of Chemistry Ceylon*
12.45 pm	Lunch

Theme Seminar
"Chemical Research and Innovations for Economic Prosperity"

Theme Seminar

Journey towards economic sustainability- Role of Chemists

O. A. Illeperuma

Professor Emeritus, Department of Chemistry, University of Peradeniya

The role of chemists is particularly important in the mineral sector, where value addition to minerals is the forte of chemists. For example, Eppawala rock phosphate can not only be used to produce fertilizers but also for the production of phosphate, which is an essential component of lithium batteries. It can also be used for manufacture of poultry feed. Similarly, Sri Lanka imports around 100,000 tons of precipitated calcium carbonate, when we have pure calcium carbonate deposits at Balangoda. The production of precipitated calcium carbonate is a simple, low technology chemical process.

Ilmenite is used in the production of titanium dioxide and is widely used as a pigment. The process involves digestion with sulphuric acid followed by the hydrolysis of the resulting titanyl sulphate. One disadvantage of this process is the relatively high temperature required and there is now research involving digestion in an autoclave for the production of high quality titanium dioxide. Another mineral which is found in very high purity is crystalline quartz. It is currently mined and powdered and exported to Japan and other countries. Although silicon production for the semiconductor industry is not possible owing to the high electric power required still, we can make things like water glass which is sodium silicate, quartz glassware, quartz crystals for watches and quartz lenses.

Value addition to graphite to make greases, crucibles for foundry works and electrodes for batteries are examples of processes which can be commenced. Electrodes in batteries can also be made using activated charcoal. One interesting mineral deposit is the iron pyrites ore at Panirandawa in the Seruvila area. This is the only sulphur containing mineral found in Sri Lanka and the only one with containing copper. This is a neglected resource, and these pyrite ores usually also have gold in its composition. Historically gold plating of pinnacles of stupas represent where gold has been used from Sri Lanka. There is also an often-neglected mineral at Ussangoda area at Hambantota. Here the red soil is rich in nickel. A simple process to extract nickel using sulphuric acid can produce nickel sulphate which can be directly used in nickel plating.

We have extensive resources of monazite and is widely sought after mineral because of its rare earth content. It was earlier collected from the beaches at Beruwela and the factory at Katukurunda processed it to produce monazite which was exported. Also, it is worthwhile to carry out research on the separation of rare earths and here too use of high temperature for the digestion is a drawback. Here again, the autoclaving method may be useful. Monazite has thorium in addition to rare earths and this is the raw material for producing fissionable uranium nuclear fuel. In this process, monazite is treated with concentrated sulphuric acid at about 230 ^{o}C and the rare earth sulphates so formed are separated by a complex process of precipitation, solvent extraction and chromatography.

Theme Seminar

The Invisible Backbone: How National Quality Infrastructure Powers Sri Lanka's Agri-Food Trade

A. M. Mubarak

former Director/CEO, Industrial Technology Institute, Sri Lanka

Sri Lanka's economic prosperity relies heavily on international trade. While market dynamics are traditionally viewed through supply and demand, the true "invisible backbone" of commerce is a robust National Quality Infrastructure (NQI). Comprising Standardization, Metrology, Accreditation, Conformity Assessment, and Technical Regulations, NQI translates micro-level laboratory precision into macro-level economic value. By examining selected historical and contemporary case studies across exports and imports, this talk demonstrates how a sound chemistry background—supported by stringent method validation, recognized accreditation, and international regulatory alignment—serves as the ultimate catalyst for securing global market share and driving Sri Lanka's economic prosperity. Ceylon Cinnamon vs Cassia: While ISO 6539:2014 Cinnamon (*Cinnamomum zeylanicum Blume*) — Specification, enforces physical baselines, securing the EU Protected Geographical Indication (PGI) requires a separate, rigorous technical specification to leverage unique chemical marker profiles—specifically negligible coumarin levels and strict cinnamaldehyde ratios—to legally insulate premium Ceylon cinnamon against cheap Cassia substitution.

Pesticide Residues in Tea: Meeting stringent global Maximum Residue Limits (MRLs) for over 600 pesticides in tea requires accredited local laboratories utilizing validated, high-sensitivity LC-MS/MS workflows to prevent costly border rejections. Chlorobenzenes in garments: The detection of volatile chlorobenzenes like PDCB in exported garments highlights the complexity of modern technical regulations. Because these toxic residues typically migrate into fabrics/accessories via air or contact in sample production rooms and logistics warehouses rather than raw material formulation, analytical quality infrastructure must monitor the physical infrastructure of the entire supply chain. DCD in Milk Powder: A historic import dispute exposed the danger of inadequate quality infrastructure when an unvalidated Infrared (IR) screening method was used to challenge New Zealand's gold-standard GC-MS/MS data. Arsenic Speciation in Fish: Trade friction over Japanese seafood imports directly catalyzed the 2022 amendment to SLS 591:2014 for canned fish specifications. By shifting the regulatory mandate from generic "Total Arsenic" testing to toxicologically realistic Inorganic Arsenic Chemical Speciation (HPLC-ICP-MS), Sri Lanka successfully eliminated artificial trade barriers while maintaining strict public safety. The ultimate reality of global commerce is that laboratory reports act as the legal passport for product mobility. Sri Lanka must therefore urgently prioritize NQI modernization, harmonizing national standards with global benchmarks and providing local industries with accessible, affordable, accredited testing services that empower domestic sectors to compete globally without barriers.

Theme Seminar

Scaling Molecules for National Economic Impact: The Energy Perspective

Ajith de Alwis

Department of Chemical and Process Engineering, University of Moratuwa

Economic development has often been driven by societies' ability to transform raw materials into higher-value products. At the heart of this transformation lies the science and engineering of molecules. "Scaling molecules" refers to the process of translating chemical, biological, or materials innovations from the laboratory scale to industrial production levels that serve national and international markets. Among the many sectors influenced by molecular-scale innovations, energy is particularly important because it underpins nearly every economic activity. A society is usually composed of two input segments – materials and energy and their presence and conversions underpin the status of the economy. Sri Lankan society has consistently exhibited significant deficits in both segments, and the emphasis is on understanding and manipulating them at the molecular level.

The energy sector is fundamentally a molecular enterprise. Fossil fuels, biofuels, hydrogen, batteries, and synthetic fuels all derive their value from molecular structures and the energy stored within chemical bonds. Nations that successfully scale the production and utilization of these energy molecules can achieve greater energy security, reduce import dependence, create high-value industries, and stimulate employment. For example, the large-scale production of bioethanol from sugarcane, biodiesel from agricultural residues, or green hydrogen from renewable electricity can transform local resources into strategic economic assets. As we are all aware, the increased emissions of a few molecules at scale are today driving a global economic transition by creating an existential situation. The molecules are greenhouse gases, with carbon dioxide being the dominant one. The solution has been in looking at hydrogen as the molecule of salvation! We are hoping to scale down one oxidation reaction and scale up another oxidation.

Scaling energy molecules also enables the development of industrial ecosystems. A bio-refinery producing ethanol can generate valuable co-products such as electricity, biogas, fertilizers, and specialty chemicals. Similarly, a hydrogen economy can support industries ranging from transportation and power generation to steel manufacturing and fertilizer production. Such integrated value chains increase resource efficiency and multiply economic benefits across sectors. While renewable energy, net zero, and just transition concepts are taking center stage in energy scenarios, the economy has been identified as requiring a mandatory transition to a circular economy. Another important molecule in this transformation is Methane, which can be sourced from waste and can also produce hydrogen.

For Sri Lanka, rich in agricultural biomass and renewable energy resources, the opportunity lies in moving beyond exporting raw materials toward producing energy carriers and value-added chemicals. Achieving this transition requires investments in research and development, pilot-scale demonstrations, industrial infrastructure, and supportive policy frameworks. Universities, research institutions, and private industry must work together to bridge the gap between scientific discovery and commercial deployment. The scientific community should be forceful in bringing this opportunity to the attention of the decision-makers.

Ultimately, scaling molecules for national economic impact is about converting scientific knowledge into productive capacity. In the energy sector, this process can strengthen economic resilience, promote sustainability, create skilled employment, and contribute to long-term national prosperity.

Theme Seminar

From the Research Bench to the Marketplace: Lessons in Innovation, Commercialization, and Economic Development

K. M. Nalin de Silva

Centre for Advanced Materials and Devices (CAMD), Department of Chemistry, University of Colombo, Colombo 03, Sri Lanka

Scientific research is widely recognized as a key driver of innovation and economic growth, yet the pathway from laboratory discovery to commercial success remains poorly understood by many stakeholders. This presentation examines the interconnected roles of fundamental research, applied research, innovation, and commercialization in building a sustainable knowledge-based economy. Fundamental research, driven by curiosity and the pursuit of new knowledge, provides the scientific foundations upon which transformative technologies and industries are built. While applied research seeks practical solutions to societal and industrial challenges, its success depends heavily on a strong base of fundamental scientific understanding. Excessive emphasis on short-term applications without adequate investment in fundamental science often leads to incremental improvements and trial-and-error approaches rather than genuine innovation.

The presentation explores the innovation pipeline from basic scientific discovery through proof-of-concept studies, prototype development, pilot-scale validation, technology maturation, and commercialization. Attention is given to the concept of Technology Readiness Levels (TRLs) and the challenges associated with crossing the "Valley of Death," where many promising technologies fail due to technical, financial, regulatory, or market-related barriers. The realities of innovation outcomes are also discussed, highlighting that only a small fraction of research outputs ultimately reach the marketplace, making long-term investment and strategic patience essential components of national innovation policy.

Drawing upon international experiences, including the successful evolution of innovation ecosystems in countries such as South Korea, the presentation argues that governments should primarily support fundamental research, human capital development, and early-stage innovation, while industry should assume increasing responsibility as technologies approach commercialization. The discussion emphasizes that economic prosperity is not generated by commercialization alone, but by a robust and integrated ecosystem in which scientific discovery, technological innovation, entrepreneurial activity, and industrial investment operate as a continuum. Ultimately, sustainable economic development depends on maintaining a strong foundation in fundamental science while systematically translating knowledge into products, processes, and services that create societal and economic value.

Theme Seminar

Harnessing Sri Lanka's Mineral Wealth for Industrial and Economic Development

Udesha Bopitiya

Managing Director, Lanmic Polymers

Sri Lanka is endowed with a diverse and strategically significant mineral resource base, including industrial minerals such as calcium carbonate, graphite, mineral sands, quartz, and clay, which constitute an important foundation for industrial development and economic growth.

The mineral sector can be broadly classified into three interdependent segments: exploration and mining, processing and refining, and manufacturing and production. Each stage within this value chain contributes distinctively to value creation through employment generation, technological advancement, industrial diversification, and export development.

Over the past decades, Sri Lanka's mineral industry has achieved notable progress in mineral beneficiation, processing technologies, and downstream manufacturing. The presentation will provide a comprehensive overview of the current state of value addition within the sector, highlighting existing industrial capabilities, successful applications, and the contribution of mineral-based industries to the national economy.

While the objective of maximising value addition is widely advocated, the long-term viability of value-added products depends on their competitiveness within global markets. Strategic decisions regarding downstream processing and product development must therefore be informed by considerations of market demand, technological feasibility, economies of scale, and integration into international value chains. Identifying opportunities that leverage Sri Lanka's comparative advantages and unique resource endowments is essential for fostering sustainable industrial growth.

This presentation further emphasises the importance of strengthening collaboration among academia, industry, and policymakers to bridge the gap between scientific research and industrial application. Sri Lanka possesses both abundant mineral resources and a strong scientific talent base; however, unlocking the full potential of these assets requires enhanced knowledge exchange, innovation, and coordinated action across stakeholders.

Harnessing Sri Lanka's mineral wealth necessitates a shared vision for industrial transformation—one that aligns resource potential, scientific expertise, industrial capability, and market realities to advance globally competitive, value-added mineral industries.

55th Annual Sessions of Institute of Chemistry Ceylon
Technical Sessions 2026

8.00 am - 3.15 pm **28th June 2026** **IChemC Malabe Campus**

8.00 am - 8.30 am	Arrival of Guests
8.30 am - 8.50 am	Kandiah Award for Applied Chemistry Lecture **Ms. Saranya Selvaraj Lavan** *University of Sri Jayewardenepura*
8.50 am - 9.10 am	CCS Researcher of the Year Lecture **Dr. Sameera R. Gunatilake** *Senior Lecturer, College of Chemical Sciences, Institute of Chemistry Ceylon*
9.10 am - 9.30 am	Institute of Chemistry Ceylon Research Award for Early Career Chemists Lecture I **Dr. C. J. Narangoda** *Senior Lecturer, Department of Chemistry, University of Sri Jayewardenepura*
9.30 am - 9.50 am	Institute of Chemistry Ceylon Research Award for Early Career Chemists Lecture II **Prof. A. G. M. J. Gunaratna** *Senior Lecturer, Department of Chemistry, University of Kelaniya*
9.50 am - 10.10 am	Refreshment Break

Presentations of Prof. M. U. S. Sultanbawa Award for Research in Chemistry

Panel Chair : *Prof Ayanthi Navarathna* ***Session Chair:*** *Prof Emeritus Ramanee Wijessekara*

Venue: *Auditorium, IChemC Malabe Campus*

Time	Title	Authors	Abstract No.
10.15 am - 10.30 am	Formulating and characterizing bentonite-intercalated and polymer-modified urea composites for controlled nutrient release	Y. Ramakrishnan, L. D. C. Nayanajith and H. P. E. De Zoysa	2025_420
10.30 am - 10.45 am	Effect of O_2 and N_2 plasma surface modification on electrodeposited Cu_2O thin films for non-enzymatic glucose sensing	J. P. K. D. Jayasekara and Dhammike Dissanayake	2025_441
10.45 am - 11.00 am	Synthesis of chitosan - *Spirulina* microcapsules *via* ionic gelation and characterization	J. H. A. C. S. Ekanayake and S. Wickramarachchi	2025_421
11.00 am - 11.15 am	Classification of tea grades from Sabaragamuwa, Ruhuna, and Dimbulla based on total polyphenolic content using a random forest machine learning model	N. P. Fernando, B. M. T. Kumarika and D. D. C. de S. Wanniarachchi	2025_369
11.15 am - 11.30 am	Synergistic enhancement of *in-vitro* antioxidant activity in essential oil and post-distillation residue-derived oleoresin combinations of *Zingiber officinale* cultivars and development of a microencapsulated antioxidant rich controlled release nutraceutical	S. M. A. U. Kumarasinghe, S. R. Wickramarachchi and H. D. Weerathunge	2025_384

11.30 am - 11.45 am	Graphene oxide catalyzed one-pot oxidative-Pictet-Spengler cascade for the synthesis of tetrahydroisoquinoline	A. R. K. Goutham and R. L. P. Weerasinghe	2025_411
11.45 am - 12.00 pm	Ritter reaction catalyzed by sulfonated graphene oxide (SGO)	J. M. Y. L. Chathuranga, M. J. Gunaratna and R. L. P. Weerasinghe	2025_376
12.00 pm - 12.15 pm	Synthesis, characterization, and zebrafish embryo imaging of group II metal-8 hydroxyquinoline complexes as novel fluorescent stains	G. N. Boteju, D. D. C. de S. Wanniarachchi and D. P. N. Silva	2025_367
12.15 pm - 12.30 pm	Sulfonated graphene oxide (SGO) catalyzed green synthesis of 2,3-diphenylquinoxaline	P. P. S. S. Gunasekara and R. L. P. Weerasinghe	2025_404
12.30 pm - 12.45 pm	Evaluation of sugar profile and total sugar content in yoghurt available in Sri Lanka	K. A. D. A. Widushi, H. P. E De Zoysa and S. M. V. V Samarasinghe	2025_423

Technical Sessions – 1

Session Chair: *Dr. D N Udukala* ***Session Co-Chair:*** *Dr. Upul Kumarasinghe*

Sub Theme: *Organic and Natural Products Chemistry* ***Venue:*** *L4 Exam Hall*

Time	Title	Authors	Abstract No.
10.15 am - 10.30 am	Bioactivity and preliminary composition evaluation of hot water extract from *Trametes coccinea*	H. M. I. Herath, A. K. T. D. Sandaruwan, H. Wijesekara and M. G. A. N. Perera	2025_351
10.30 am - 10.45 am	Evaluation of antioxidant and antidiabetic activities of Megha Vac Recovery and Megha Primal Intake: An *in vitro* study for newly formulated herbal-based food supplements	A. C. H. Elaphatha, N. Jayathilaka, K. N. Seneviratne, U. S. Gunawardhana, M. D. J. Abeygunawardena, N. Gunawardhana and P. A. Paranagama	2025_354
10.45 am - 11.00 am	Cross-sectional analysis of anthropometric parameters and plasma glucose in a sample of undergraduate students at the Institute of Chemistry, Ceylon	N. V. Madhusara, A. A. P. Keerthi and S. Ekanayake	2025_356
11.00 am - 11.15 am	Comparative analysis of vitamin C, dietary fiber and selected mineral content of fresh and commercially available fruit juices	W. A. A. D. Jayathilake, A. A. P. Keerthi and S. Ekanayake	2025_357
11.15 am - 11.30 am	Effect of processing on antioxidant activity and phytochemical constituents of green, white, and black tea and tea flowers (*Camellia sinensis*)	A. M. I. Darshani and E. M. R. K. B. Edirisinghe	2025_362
11.30 am - 11.45 am	Cytotoxic and antioxidant activities of some marine sponges from Sri Lanka evaluated by brine shrimp lethality test (BSLT) and DPPH assay	A. M. S. K. Indurangi, E. M. R. K. B. Edirisinghe and M. F. M. Fairoz	2025_363

11.45 am - 12.00 pm	GC–MS based fatty acid profiling and multivariate analysis of rice bran oil from traditional Sri Lankan rice varieties	H. M. N. S. Dissanayake and E. M. R. K. B. Edirisinghe	2025_364
12.00 pm - 12.15 pm	*In vitro* antidiabetic activity of the leaf extract of *Dillenia retusa Thunb*	W. W. Y. A. Jayawardhana and M. J. Gunaratna	2025_365

Technical Sessions – 2

Session Chair: *Prof. Emeritus M. D. P. de Costa* ***Session Co-Chair:*** *Prof. M. P. Deeyamulla*

Sub Theme*: Physical and Analytical Chemistry* ***Venue:*** *Level 1 Lecture Theater*

Time	Title	Authors	Abstract No.
10.15 am - 10.30 am	Assessment of $PM_{2.5}$-bound water-soluble anions during episodic air pollution events in Colombo Metropolitan City, Sri Lanka	Y. B. Thuduhena, R.D.R. Ruhunuge, H. D. S. Premasiri	2025_433
10.30 am - 10.45 am	Sustainable optimization of modifier-Free graphite furnace atomic absorption spectrophotometric method for Trace Cadmium determination in seawater	N Anoja, R. C. L. De Silva and J. Prabagar	2025_436
10.45 am - 11.00 am	Electroanalytical detection of diclofenac using nano CuO modified glassy carbon electrode	S. D. Kolongoda and A. N. Navaratne	2025_389
11.00 am - 11.15 am	Modelling of corrosion of mild steel in strong acidic media through mass loss measurements	Tharuka S. Kumara and Namal Priyantha	2025_391
11.15 am - 11.30 am	Investigation of the effect of interlayer anion towards corrosion inhibition properties of Zn-Al layered double hydroxides	Wayani Bhaddrathilake, Sasitha C. Abeyweera, and H. M. D. Namal Priyantha	2025_393
11.30 am - 11.45 am	Biosorption behavior of copper onto curry leaves (*Murraya koenigii*): isotherm, kinetic and thermodynamic perspectives	S. P. H. Prabodhinie, K. A. D. D. Sakunthala, W. P. R. T. Perera, T. Abeysinghe, J. A. Liyanage and W. A. P. J. Premaratne	2025_398
11.45 am - 12.00 pm	Optimization of experimental parameters and thermodynamics analysis for biosorption of Cd(II) from aqueous solutions using raw biomass and biochar of *panicum maximum* leaves	S. Vihanga and N. Priyantha	2025_400
12.00 pm - 12.15 pm	Biosorption of Cu (II) using dried *Garcinia quaesita* rinds: equilibrium, kinetic, and thermodynamic investigations	W. A. E. Ayodya, K. A. D. D. Sakunthala, W. P. R. T. Perera, T. Abeysinghe, J. A. Liyanage and W. A. P. J. Premaratne	2025_401

Technical Sessions – 3

Session Chair: *Dr. Asanka Ratnayake* ***Session Co-Chair:*** *Dr. Dumindu Premachandra*

Sub Theme: *Nanoscale Materials* ***Venue:*** *Level 2 Lecture Theater*

Time	Title	Authors	Abstract No.
10.15 am - 10.30 am	Development of low-cost silica gel from rice husk ash for thin layer chromatography (TLC)	M. R. W. Godapitiya, K. G. S. Madushantha and C. N. Ratnaweera	2025_352
10.30 am - 10.45 am	Development of a metal composite for the removal of phosphates from aqueous solutions	P. P .R. Bhagya, P. L. A. T. Cooray, T. Senapathi and S. S. Liyanage	2025_370
10.45 am - 11.00 am	Development of sustained-release hydrogel beads of aspirin	J. G. K. N. Sasindi and H. I. C. De Silva	2025_373
11.00 am - 11.15 am	Assessing the efficiency of eggshell – derived calcium oxide nanoparticles on photocatalytic dye degradation and antibacterial activity	N. A. M. Fernando and R. M. A. S. Rathnayake	2025_375
11.15 am - 11.30 am	Plant-mediated synthesis of ZnO nanoparticles from *Dillenia triquetra* leaf extract and investigation of photocatalytic efficiency	R. M. T. D. Rathnayake and K. C. Weerasiri	2025_396
11.30 am - 11.45 am	Green synthesis of zinc oxide nanoparticles using *Pandanus ceylanicus* leaf extract and investigation of their antibacterial activity	R. L. Lokumanage and K. C. Weerasiri	2025_397
11.45 am - 12.00 pm	Sustainable synthesis of zinc oxide nanoparticles from spent coffee grounds as a reusable catalyst for Biginelli reaction	M. U. Ismail and H. I. C. De Silva	2025_437
12.00 pm - 12.15 pm	Synthesis and spectroscopic characterization of novel sulfonamide-based picolylamine ligands and their platinum(II) complexes towards potential biological applications	W. P. M.Alwis, J. A. S. Gayara, F. R. Fronczek and N. T. Perera	2025_349

Technical Sessions – 4

Session Chair: *Dr. C N Ratnaweera* ***Session Co-Chair:*** *Dr. Jayangika Dahanayake*

Sub Theme: *Computational Chemistry* ***Venue:*** *Level 3 Lecture Theater*

Time	Title	Authors	Abstract No.
10.15 am - 10.30 am	Synthesis, biological activity evaluation, and molecular docking studies of amino acid and amine-derived Schiff bases	A. K. T. D. Sandaruwan, H. M. I. Herath, H. G. N. Rajapaksha and M. G. A. N. Perera	2025_345
10.30 am - 10.45 am	First principle computational modeling of electronic and structural properties of zeolites by using periodic DFT	B. M. M. D. Basnayake, W. W. P. De Silva and C. N. Ratnaweera	2025_353

10.45 am - 11.00 am	Synthesis of 2-phenyl-3H-quinazolin-4-one derivatives and *in vitro* and *in silico* evaluation as potential antidiabetic agents *via* α-amylase inhibition and glucose uptake in yeast cells	K. P. D. H. Pathirana and M. J. Gunaratna	2025_360
11.00 am - 11.15 am	Regulatory-compliant comparative *in vitro* dissolution evaluation of immediate-release paracetamol tablets under BP 2024 and ICH M9 biowaiver framework	D. Kumarasegaran, R. C. L. De Silva and P. A. S. R. Wickramarachchi	2025_377
11.15 am - 11.30 am	Targeting NPC1L1-mediated cholesterol absorption with *Woodfordia fruticosa* phytochemicals: A computational investigation via molecular docking, MD simulation, and ADMET profiling	B. N. R. Ariyarathne, D. R Pandithavidana and J. Dahanayake	2025_378
11.30 am - 11.45 am	Unlocking computational screening of *Centella asiatica* phytochemicals as dual COX-2 and P2X3 inhibitors	S. G. Ramanayake, J. N. Dahanayake and P. R. Paligaspe	2025_379
11.45 am - 12.00 pm	Computational investigation of the endocrine-disrupting potential of Bisphenol F and its sulfate metabolite targeting the RAR-γ receptor	B.P. Welagedara, J.N. Dahanayake	2025_388
12.00 pm - 12.15 pm	Synthesis of novel 2,3-dihydroquinazolin-4(1H)-one derivatives and determining their antimicrobial activity *via in-silico* and *in-vitro* study	H. T. P. D. Perera, M. J. Gunaratna, and D. N. Udukala	2025_408

Technical Sessions – 5

Session Chair: *Prof. Laksiri Weerasinghe* ***Session Co-Chair:*** *Prof. Medha J. Gunaratna*

Sub Theme: *Organic and Natural Products Chemistry* ***Venue:*** *L4 Exam Hall*

Time	Title	Authors	Abstract No.
1.30 pm - 1.45 pm	Comparative analysis of the main plant components of Megha Vac Recovery and Megha Primal Intake for their antidiabetic and antioxidant potential	A. C. H. Elaphatha, N. Jayathilaka, K. N. Seneviratne, U. S. Gunawardhana, M. D. J. Abeygunawardena, N. Gunawardhana and P. A. Paranagama	2025_355
1.45 pm - 2.00 pm	*In vitro* antifungal activity of *Senna alata*, *Syzygium cumini*, and Aloe vera extracts against *Colletotrichum gloeosporioides* causing mango anthracnose	A. U. Watagoda, I. G. N. Hewajulige, P. A. S. R. Wickramarachchi and P. Ranasinghe	2025_382
2.00 pm - 2.15 pm	Investigation of anti-inflammatory and antibacterial activities of *Mimosa pigra* L. seed extracts	W. G. A. Anuhas and K. C. Weerasiri	2025_395

2.15 pm - 2.30 pm	Comparative classification of Sri Lankan tea from seven regions using pH, total polyphenolic content, and dry matter content as analytical parameters	L. A. K. M. Weerarathne, F. N. Prasangika and D. D. C. de S. Wanniarachchi	2025_405
2.30 pm - 2.45 pm	Analysis of beta carotene content in a value-added pumpkin (*Cucurbita spp*.) and curry leaves (*Murraya koenigii*) instant soup mixture	T. T. M. D. C. N. Thennakoon, W. P. K. K. de Silva and D. T. Abeysinghe	2025_413
2.45 pm - 3.00 pm	Synthesis and characterization of cinnamon bark oil – encapsulated alginate microcapsules	R. M. S. S. K. Rathnayake and P. A. S. R. Wickramarachchi	2025_424
3.00 pm - 3.15 pm	Isolation of eugenol from cinnamon leaf oil *via* alkaline extraction and methylation	W.G.K.K.D. Fernando, P. A. S. R. Wickramarachchi and P.A.Paranagama	2025_435

Technical Sessions – 6

Session Chair: *Prof. D. P. Dissanayake* ***Session Co-Chair:*** *Dr. Kushan Weerasiri*

Sub Theme: *Physical and Analytical Chemistry* ***Venue:*** *Level 1 Lecture Theater*

Time	Title	Authors	Abstract No.
1.30 pm - 1.45 pm	Advancing sustainable corrosion control: elucidating the protective mechanism of chitosan-pectin biopolymers against acidic corrosion of stainless-steel Grade 202	M. H. N. Revon and N. Priyantha	2025_402
1.45 pm - 2.00 pm	Spatial and temporal variation of atmospheric quality through analysis of rainwater: a comparative study of Kandy, Peradeniya, and Horana, Sri Lanka	D. A. K. L. Perera and N. Priyantha	2025_403
2.00 pm - 2.15 pm	Bioaccumulation of heavy metals/ metalloids and associated health risk assessment in *Scylla serrata* and *Penaeus* spp. from the Negombo estuary, Sri Lanka	W. A. S. Fernando, K. A. D. D. Sakunthala, W. P. R. T. Perera, W. A. P. J. Premaratne and J. A. Liyanage	2025_418
2.15 pm - 2.30 pm	Toxic heavy metal/metalloid contamination and health risk assessment in *Etroplus* spp.; A study in Negombo Estuary, Sri Lanka	M. A. U. Dias, K. A. D. D. Sakunthala, W. A. P. J. Premaratne, W. P. R. T. Perera and J. A. Liyanage	2025_427
2.30 pm - 2.45 pm	Evaluation of pre-oxidation strategies for surface water treatment: a case study of dry aru, Kilinochchi District, Sri Lanka	R. Sajimeera, J. Prabagar, N. Anoja and A. Kumuthini	2025_429
2.45 pm - 3.00 pm	Linear vs. non-linear isotherm modeling of interaction of Ni(II) with *Panicum maximum* leaf biosorbent	V. N. Premathilaka and N. Priyantha	2025_371

Technical Sessions – 7

Session Chair: *Prof. Suranga Wickramarachchi* ***Session Co-Chair:*** *Dr. Isuri Weeraratne*

Sub Theme: *Nanoscale Materials* ***Venue:*** *Level 2 Lecture Theater*

Time	Title	Authors	Abstract No.
1.30 pm - 1.45 pm	Biosorption kinetics of the transfer of Cd(II) ions from aqueous solution on powdered *Dillenia suffruticosa*	Pathum Anuradha and Namal Priyantha	2025_387
1.45 pm - 2.00 pm	Release of microplastics from tea bags produced in Sri Lanka	P. K. K. N Jayawardane and H. M. K. K. Pathirana	2025_440
2.00 pm - 2.15 pm	Enhanced phosphate adsorption using metalimpregnated coconut coir biochar: a comparative study of Al and Mg modification	Thinal Singhabahu, D. S. P. Perera, Sehan Jayasinghe and A. D. L. Chandani Perera	2025_442
2.15 pm - 2.30 pm	Corrosion inhibition of iron in saline medium by schiff base derived Co(II) and Zn(II) complexes as self-assembled protective layers	M. G. S. Nisansala, W. A. H. Shashinika, C. J. Narangoda and A. D. K. I. Weeraratne	2025_414
2.30 pm - 2.45 pm	Sustainable copper detoxification using *Murraya koenigii* leaf powder: a low-cost biosorbent for biomedical applications	N. D. H. B. Aberathna, Susanthi Jayasinghe, Sehan Jayasinghe and Chandani Perera	2025_444
2.45 pm - 3.00 pm	Study of microplastic contamination in table salt of different brands in Sri Lanka	K. G. T. Amarabandu and H. M. K. K. Pathirana	2025_439

Technical Sessions – 8

Session Chair: *Dr. Priyani R. Paligaspe* ***Session Co-Chair:*** *Mr. Anushanga Rodrigo*

Sub Theme: *Computational Chemistry* ***Venue:*** *Level 3 Lecture Theater*

Time	Title	Authors	Abstract No.
1.30 pm - 1.45 pm	*In silico* comparative analysis of curcumin and acarbose as inhibitors of human pancreatic alpha-amylase	Chamika Badullewa and U. A. A. Rodrigo	2025_443
1.45 pm - 2.00 pm	Computational study of ginkgolide B and P2X7 receptor interactions in neuroinflammatory pathways	I. B. P. T. Imbulana, U. A. A. Rodrigo and R. S. Jayakody	2025_417
2.00 pm - 2.15 pm	Molecular docking and dynamics of carnosic acid-ALDH1A1 to overcome chemoresistance in ovarian cancer	S. B. Kannangara, U. A. A. Rodrigo and R. S. Jayakody	2025_422
2.15 pm - 2.30 pm	In silico modelling of thymoquinone disruption of PCSK9-LDLR binding for cholesterol regulation	N. L. Sirimanne, U. A. A. Rodrigo and R. S. Jayakody	2025_425
2.30 pm - 2.45 pm	Computational docking and molecular dynamics study of andrographolide binding to aquaporin-4 to explore neurological edema modulation	G. A. D. Deshapriya, U. A. A. Rodrigo and R. S. Jayakody	2025_426

Abstracts of Prof. M. U. S. Sultanbawa Award for Research in Chemistry 2026

Abstract No: 2025_367

Synthesis, characterization, and zebrafish embryo imaging of group II metal-8-hydroxyquinoline complexes as novel fluorescent stains

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8-Hydroxyquinoline (8-HQ) has excellent chelating properties because it can form coordination complexes with a large number of metal ions through oxygen and nitrogen binding sites. The fluorescence properties of 8-HQ are an important focus in bioimaging research. This study aimed to synthesize and characterize Group II metal complexes of 8-Hydroxyquinoline and to determine whether they can be used as novel fluorescent stains using Zebrafish embryos. Accordingly, group II metal ion complexes: Mg-8HQ, Ca-8HQ, Sr-8HQ, and Ba-8HQ were synthesized using deionized water as the solvent. Then they were characterized through UV-Visible and FTIR spectroscopic analyses. In UV-Visible spectroscopic analysis, the characteristic absorption maxima compared to the 8-HQ free ligand confirmed successful complex formation. In FTIR, the appearance of a new band in the low-frequency region corresponding to the metal-oxygen stretching vibration, which includes bands at approximately 509 cm^{-1} for Mg-O, 492 cm^{-1} for Ca-O, 647 and 588 cm^{-1} for Sr-O, and 473 cm^{-1} for Ba-O stretching vibrations, confirmed successful complex formation. Fluorescence study with zebrafish embryos showed that all metal complexes exhibited fluorescence localized in the trunk and tail skeletal muscles, confirming their ability to be used as fluorescent stains. Fluorescence intensity was shown to decrease with decreasing concentration. The acute zebrafish embryo toxicity bioassay was done over a 72-hour post-exposure period across concentrations ranging from 10^{-4} to 10^{-9} $molL^{-1}$. A dose-dependent toxic effect was observed, with LD_{50} values of 1.35×10^{-4} $molL^{-1}$ for Mg-8HQ, 4.06×10^{-8} $molL^{-1}$ for Ca-8HQ, and 6.49×10^{-7} $molL^{-1}$ for Ba-8HQ, with abnormalities such as head deformities, spinal curvature, and lack of pigmentation. Sr-8HQ showed 90% mortality even at 1×10-9 $molL^{-1}$ concentration. No mortality was observed for Mg-8HQ and Ca-8HQ at 1×10^{-9} $molL^{-1}$. Among the four metal complexes, Mg-8HQ and Ca-8HQ are potential candidates as novel fluorescent stains with low mortality and intense fluorescence compared to Sr-8HQ and Ba-8HQ.

Keywords:

8-Hydroxyquinoline, Fluorescence, Mortality, Zebrafish

Abstract No: 2025_369

Classification of tea grades from Sabaragamuwa, Ruhuna, and Dimbulla based on total polyphenolic content using a random forest machine learning model

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Ceylon tea is a vital component of the economy of Sri Lanka and maintaining high export standards requires accurate identification of tea grades Tea grades such as Broken Orange Pekoe (BOP), Broken Orange Pekoe Fannings (BOPF), and Dust are traditionally distinguished based on particle size. However, the particle sizes of these grades are different, yet the differences are often subtle, making it difficult to reliably identify tea grades through visual inspection alone, particularly when samples originate from the same region. This limitation creates challenges for accurate grading and quality control within the tea industry. This study investigated the use of total polyphenolic content (TPC) as a chemical marker to discriminate tea grades and developed machine learning models for classification. Tea samples were collected from three major tea-growing regions of Sabaragamuwa, Ruhuna, and Dimbulla. The TPC of each sample was determined using the Folin–Ciocalteu method according to ISO 14502-1. For each region, 90 TPC values were used for both ANOVA and machine learning. The relationship between tea grades and TPC values was evaluated using analysis of variance (ANOVA) in Minitab (version 2022). The results revealed statistically significant differences between tea grades and TPC values within each region ($P < 0.005$) and F-values were 60.69 (Dimbulla), 26.57 (Ruhuna), 4.74 (Sabaragamuwa), indicating that TPC can effectively differentiate tea grades. The Random Forest model was applied for classification and a higher accuracy (Ruhuna:82.35% Dimbulla: 95.38% Sabaragamuwa:83.33%) was obtained confirming the suitability of the model for tea grade discrimination. The proposed approach can support the development of analytical tools for the tea industry, contributing to improved quality control and authentication of Ceylon tea.

Keywords:

Ceylon tea, Total polyphenol content, Tea grade classification, Random Forest

Acknowledgment:

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Abstract No: 2025_376

Ritter reaction catalyzed by sulfonated graphene oxide (SGO)

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A significant practical drawback of the Ritter reaction is the use of homogeneous acid catalysts such as H_2SO_4 and p-toluenesulfonic acid, resulting in their difficult separation from a reaction mixture and inability to use with acid sensitive starting materials. In this work, sulfonated graphene oxide (SGO) was explored as an alternative heterogeneous catalyst instead of traditional homogeneous acid catalysis to improve reaction efficiency and sustainability. Herein, an efficient and sustainable way to catalyze the Ritter reaction was described along with the successful synthesis of *N*-benzhydrylacetamide from the reaction of diphenylmethanol with acetonitrile. To determine the catalytic potential of SGO in the Ritter reaction, diphenylmethanol was used as a model substrate. The SGO catalyst was synthesized through the modified Tour's method and characterized using FT-IR, XRD and Raman spectroscopy. With synthesized catalyst, Ritter reaction was carried out in acetonitrile under reflux at 80–82 °C for 7 hours, with the catalyst loading of 0.54 g g^{-1}. The progress of the reaction was monitored by thin-layer chromatography and a 71% of yield was obtained. The formation of the target amide, *N*-benzhydrylacetamide, was verified by the presence of characteristic amide functional group absorptions in the FT-IR spectrum. The results confirmed successful catalysis of the Ritter reaction and the effectiveness of SGO as a heterogenous solid acid catalyst under the examined conditions. Furthermore, the recyclability of the catalyst was demonstrated for five consecutive catalytic cycles. The challenges encountered in the practical process, such as the handling of the solvent and the minor contamination during the filtration process, were identified and resolved without affecting the outcome. Optimizing the reaction parameters (temperature, reaction time, catalyst loading and solvent system) will be further investigated to increase the efficiency, practicality, and overall performance of the catalytic system.

Keywords:

Ritter reaction; sulfonated graphene oxide; *N*-benzhydrylacetamide; amide synthesis.

Acknowledgement:

Financial assistance was provided by the Institute of Chemistry Ceylon; instrumental and laboratory facilities were provided by the Institute of Chemistry Ceylon and SLINTEC (Sri Lanka Institute of Nanotechnology), Sri Lanka, for characterization facilities.

Abstract No: 2025_384

Synergistic enhancement of *in-vitro* antioxidant activity in essential oil and post-distillation residue-derived oleoresin combinations of *Zingiber officinale* cultivars and development of a microencapsulated antioxidant rich controlled release nutraceutical

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Two widely cultivated ginger cultivars in Sri Lanka, named Ceylon and Rangoon (*Zingiber officinale*) were investigated to develop a valorized, high potency microencapsulated nutraceutical from ginger processing by-products. Essential oils (EOs) were extracted from fresh rhizomes by hydrodistillation; GC-MS profiling of EO confirmed zingiberene as the dominant volatile in both cultivars, with Ceylon exhibiting a monoterpene-enriched chemotype (eucalyptol 7.76%) and Rangoon a sesquiterpenoid-dominant profile (zingiberene 31.32%). Post-distillation residues (PDR) were subjected to Soxhlet extraction with acetone and ethanol to yield PDR-derived oleoresins; Ceylon consistently produced higher oleoresin yields while Rangoon yielded more EO, and acetone outperformed ethanol across both cultivars. Antioxidant screening (DPPH, FRAP, TPC, TFC, ORAC) established that PDR-oleoresins possessed substantially higher bioactivity (DPPH IC_{50}: 219-240 µg/mL; FRAP: 740-808 mg Trolox/g; TPC: 222-297 mg GAE/g; ORAC: 86-99 mg Trolox/g) relative to EOs (IC_{50} > 3,300 µg/mL; FRAP: 29-32 mg Trolox/g). Overall, Ceylon ginger exhibited superior antioxidant properties over Rangoon. Synergistic interactions between EO and PDR-oleoresin were evaluated across nine blend ratios (EO:Oleoresin 1:9 to 9:1); the Ceylon 4:6 blend achieved the highest synergy index (98.05%; Chou-Talalay CI = 0.020; DPPH IC_{50} = 7.480 µg/mL) and was chosen as the optimal blend by quadratic regression modelling. Microencapsulation of the optimal blend was optimized via lyophilization using Maltodextrin (MD) and Gumarabic (GA) wall matrices across five formulations. Formulation F3 (MD:GA 72:28) achieved 84.7% encapsulation efficiency, 1.78% moisture content, and 99.1% oil recovery; scanning electron microscopy revealed irregularly shaped microcapsules with a rough, porous wall surface and particle sizes of 20-100 µm. Antioxidant release of F3 under hot water brewing simulation (85°C) followed first-order kinetics (k_1 = 0.456 min^{-1}; $t_{½}$ = 1.52 min), with delivering approximately 82-fold higher antioxidant activity on an equal-mass basis relative to freshly chopped Ceylon ginger. These results demonstrate the successful valorization of ginger PDR into a protected, high-potency functional food ingredient.

Keywords:

Microencapsulation; *Zingiber officinale*; Antioxidant synergism; Controlled release

Acknowledgement:

Financial assistance by the Herbal Technology Section of the Industrial Technology Institute, Sri Lanka (Sri Lanka Treasury Grants No. 24231).

Abstract No: 2025_404

Sulfonated graphene oxide (SGO) catalyzed green synthesis of 2,3-diphenylquinoxaline

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The compound 2,3-diphenylquinoxaline is a valuable nitrogen-containing heterocyclic compound with applications in medicinal, pharmaceutical, and materials chemistry. Conventional synthetic methods often employ various homogeneous and heterogeneous catalysts. Many of these methods have disadvantages, such as the use of strong acidic conditions, high temperatures, and high cost. This study aims to develop an efficient, green, and metal-free catalytic method for synthesizing 2,3-diphenylquinoxaline using sulfonated graphene oxide (SGO). SGO has been identified as a heterogeneous solid acid catalyst for various organic transformations because of its high surface area, large amount of acidic functional groups on its surface, and thermal stability. In this study, 2,3-diphenylquinoxaline was synthesized via double condensation of benzil and o-phenylenediamine by using SGO as a metal-free green solid acid catalyst in ethanol at 78 °C. The reaction produced the desired product in 90.4% yield in 40 minutes. The synthesized compound was characterized using FTIR (ATR method), which confirmed the formation of a 2,3-diphenylquinoxaline structure with these diagnostic peaks, aromatic C-H stretching is at 3056 cm^{-1}, 1546 cm^{-1}, 1479 cm^{-1}, and 1442 cm^{-1} correspond to the C=N stretching in the quinoxaline ring, a 1340 cm^{-1} and 1221 cm^{-1} correspond to the C-N stretching, while 1018 cm^{-1} and 979 cm^{-1} correspond to the in-plane aromatic C-H bending. A very strong peak at 764 cm^{-1} corresponds to out-of-plane C-H bending. The melting point of the final product is 125.3 °C, which is within the range of the values reported in the literature. These results demonstrate that the SGO is an efficient green catalyst for 2,3-diphenylquinoxaline synthesis. Further studies will investigate the mechanistic role of SGO, focusing on its active sites and interactions with reactants to better understand and optimize its catalytic performance and reusability.

Keywords:

2,3-diphenylquinoxaline; Sulfonate graphene oxide (SGO); o-phenylenediamine; benzil.

Abstract No: 2025_411

Graphene oxide catalyzed one-pot oxidative-Pictet-Spengler cascade for the synthesis of tetrahydroisoquinoline

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The Pictet–Spengler reaction is a key transformation for synthesizing tetrahydroisoquinoline (THIQ) heterocycles, a privileged scaffold with antimicrobial, anticancer, and neuroprotective properties. However, conventional methods rely on corrosive Bronsted acid catalysis, generate metallic waste, and use sensitive aldehydes as substrates. This study investigates a sustainable one-pot cascade reaction using graphene oxide (GO) as a catalyst and a green oxidant to perform in-situ benzyl alcohol oxidation followed by Pictet–Spengler cyclization with tyrosine methyl ester. GO was synthesized via modified Hummers' method and further functionalized to sulfonated graphene oxide (SGO). Successful oxidation and sulfonation were confirmed by FTIR (C=O at ~1727 cm^{-1}, S=O at ~1185 and 1037 cm^{-1}) and XRD (shift from 26.49° in graphite to 10.64° in GO and 9.91° in SGO). The one-pot sequence began with GO catalyzed benzyl alcohol oxidation in acetonitrile under reflux to form benzaldehyde which was confirmed by an aldehyde C=O stretch at ~1694 cm^{-1} and a positive 2,4-dinitrophenylhydrazine (DNPH) test. Then tyrosine methyl ester was added to reaction flask, and the Schiff base formation was monitored by using TLC. Based on TLC analysis consumption of the Schiff base (Rf = 0.93) and a new spot with lower mobility (Rf = 0.3) was observed. The product was purified by flash chromatography. FTIR of the isolated product showed loss of aldehyde C=O (~1700 cm^{-1}) and aldehydic C–H (~2720–2820 cm^{-1}) peaks, with a broad peak at ~3200–3350 cm^{-1} (N–H/O–H) and a C–N band at ~1200–1300 cm. FTIR analysis showed spectral features consistent with oxidation and imine formation; however, these results alone are insufficient to conclusively establish the catalytic role of GO in promoting the Pictet–Spengler cyclization. Ongoing work focuses on optimizing cyclization conditions and the mechanistic role of SGO in this reaction while confirming the final product by using ^{1}H NMR.

Key words:

Pictet–Spengler reaction, tetrahydroisoquinoline (THIQ), graphene oxide (GO), one-pot cascade

Abstract No: 2025_420

Formulating and characterizing bentonite-intercalated and polymer-modified urea composites for controlled nutrient release

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Conventional urea fertilizers exhibit critically low nitrogen use efficiency attributable to rapid aqueous dissolution, resulting in substantial urea losses. Contemporary controlled-release fertilizer technologies face significant constraints, including prohibitive manufacturing costs, environmental persistence of synthetic polymer coatings, and limited scalability, challenges particularly severe in dry tropical soils with low water retention. This study developed a controlled-release formulation employing molecule intercalation and polymer modification to achieve sustained urea release through a synergistic dual barrier mechanism. Bentonite-urea composites (50:50) were prepared through mechanical homogenization, with polyvinyl alcohol (PVA) incorporated at systematically varied concentrations (1%, 3%, and 5%) as a binder. XRD analysis confirmed successful urea intercalation, evidenced by d_{001} basal spacing expansion from 14.84 Å to 18.59 Å, indicating urea molecule insertion between the bentonite interlayers. FTIR analysis confirmed the presence of characteristic functional groups of both urea and bentonite in the composite. The observed reduction in O–H stretching intensity suggested weak hydrogen-bonding interactions between urea and bentonite. SEM analysis showed that the final composite (urea–bentonite with 5% PVA) displayed a more compact, smoother, and partially agglomerated surface, indicating successful urea incorporation and the formation of a PVA polymer network that covers the clay layers, fills void spaces, and reduces surface porosity. Bentonite intercalation extended the urea release duration to 6 hours ($R^2 = 0.96$). Furthermore, polyvinyl alcohol (PVA) modification exhibited a concentration-dependent retardation effect, increasing the release duration to 24 hours at 1% PVA, 48 hours at 3% PVA, and 72 hours at 5% PVA. The optimized 5% PVA formulation demonstrated anomalous transport behavior (n=0.59), indicative of coupled Fickian diffusion and polymer relaxation, achieving an 81% reduction in release rate constant. These findings demonstrate that bentonite-PVA dual barrier systems achieve controlled urea release, although comprehensive field validation and techno-economic assessment are necessary for practical implementation.

Keywords:

Controlled-release fertilizer, nitrogen efficiency, urea, bentonite, polyvinyl alcohol

Abstract No: 2025_421

Synthesis of chitosan - *Spirulina* microcapsules *via* ionic gelation and characterization

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Spirulina, which belongs to genus *Arthrospira platensis*, is a nutritionally rich microalga, having high protein content and widely used in the field of aqua culture. Despite its nutritional benefits, the direct use of Spirulina in aquatic systems is constrained by its high solubility and rapid nutrient leaching. This will reduce its efficiency as a feed component. To address these limitations, the present study focused on chitosan encapsulated *Spirulina* microcapsules (CS-SMCs) via ionic gelation method with sodium tri poly phosphate (STPP) as a crosslinker and microcapsule characterization. The optimized formulation (1.5% chitosan, 0.5% STPP and 1:20 Spirulina to water) with a high encapsulation efficiency of 93.9±2.0%. The synthesized microcapsules are subjected to comprehensive physicochemical characterization by Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), and thermogravimetric analysis (TGA). FTIR confirmed successful encapsulation with characteristic peaks at 3285 cm^{-1} (O-H and N-H stretching) and 1638-1547 cm^{-1} (amide I and II bands). SEM revealed predominantly spherical morphology with an average particle size of 880 ± 88 µm. TGA indicated improved thermal stability compared to free *Spirulina*. Overall, the findings demonstrate that chitosan encapsulation effectively enhances the physical stability of *Spirulina* for aquaculture applications.

Keywords:

Chitosan microcapsules, *Spirulina*, ionic gelation, characterization

Abstract No: 2025_423

Evaluation of sugar profile and total sugar content in yoghurt available in Sri Lanka

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Yoghurt is considered as a healthy dairy food product due to the presence of lactose, proteins, Calcium, and probiotics. Nevertheless, yoghurts are found to have higher levels of added sugars, particularly sucrose. As per Sri Lanka Standard 824 Part 02 :2018, Specifications for fermented milk products Part 02 Yoghurt, maximum added sugar content is 10 percent by mass. A study was done to quantify total sugar and added sugar content in yoghurt, which are available in the Sri Lankan market by using High-performance liquid chromatography (HPLC). Sucrose, lactose, glucose, fructose, and maltose content of various types of yoghurts including vanilla-flavored, mixed berry, strawberry, set yoghurt, and Greek-style yoghurt (n=6 from each type) from two different batches are collected from the retail outlets in Colombo. Sugar profile was analyzed after clarification using Carrez reagent, followed by filtration, using an NH_2 column with an acetonitrile–water mobile phase (80:20) by the HPLC. The results revealed a wide range of variation in the sugar profile, total sugar and sucrose content in different types of yoghurt samples. Set yoghurt contained the highest total sugar content (25.5 g/100 g) and the highest amount of average sucrose (added sugar) (20.74 g/100 g), while mixed berry yoghurt contained the lowest amount (5.8 g/100 g). Greek yoghurt has the lowest lactose content (1.14 g/100 g) while set yoghurt has the highest (4.74 g/100 g). The results revealed that yoghurt available in the market contain higher amounts of added sugars (sucrose) which affects its nutritional quality. The study emphasizes the need for proper nutritional labeling and regulating the added sugar content via product reformulation on yoghurt samples available in Sri Lanka as frequent consumption of high levels of added sugars is linked to the development of non-communicable diseases.

Key words:

Yoghurt, Sugar Profile, HPLC, diabetes

Abstract No: 2025_441

Effect of O_2 and N_2 plasma surface modification on electrodeposited Cu_2O thin films for non-enzymatic glucose sensing

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The purpose of this study was to investigate the effect of O_2 and N_2 plasma surface modification on the electrochemical performance of electrodeposited Cu_2O thin films on stainless steel for non-enzymatic glucose sensing. Cu_2O thin films were electrodeposited on stainless steel substrates, and a 1 cm × 1 cm area of each coated electrode was selectively treated with O_2 plasma and N_2 plasma, while one Cu_2O-coated electrode was kept untreated as a control. The remaining surface area was masked with insulating emulsion paint so that only the selected active region was exposed. Glucose solutions of 0.001 M, 0.005 M, 0.01 M, 0.05 M, and 0.1 M were prepared, and the pH of the solutions was maintained within the range of 8.4–8.5. The electrochemical response of the O_2 plasma-treated, N_2 plasma-treated, and untreated electrode was then evaluated using cyclic voltammetry. The results showed that the O_2 plasma-treated Cu_2O electrode exhibited the highest oxidation peak current, followed by the N_2 plasma-treated electrode, while the untreated electrode showed the lowest current response. In addition, the anodic current generally increased with increasing glucose concentration, indicating a concentration-dependent electrochemical behavior. These findings suggest that plasma surface modification enhances the glucose sensing performance of Cu_2O-coated stainless-steel electrodes, with O_2 plasma treatment showing the greatest improvement, demonstrating the potential of plasma-modified Cu_2O thin films for non-enzymatic glucose sensing applications.

Keywords:

non-enzymatic glucose sensing; Cu_2O thin films; plasma treatment; cyclic voltammetry

Abstracts of Research Papers to be presented at the 55th Annual Sessions 2026

Abstract No: 2025_345

Synthesis, biological activity evaluation, and molecular docking studies of amino acid and amine-derived Schiff bases

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This study aimed to synthesize and evaluate a series of amino acid and aromatic amine-derived Schiff bases specifically as targeted antioxidant agents and antifungal inhibitors of ergosterol biosynthesis. Eight compounds five amino acid-based and three amine-based were successfully synthesized. Structural formation of the azomethine linkage was confirmed by UV-Visible and FTIR spectroscopy, supplemented by melting and boiling point literature comparisons. Biological screening assessed DPPH radical scavenging, cell hemolysis, *Saccharomyces cerevisiae*-based antifungal activity, and brine shrimp lethality. Additionally, molecular docking was performed against Lanosterol 14-α-demethylase to evaluate specific binding interactions relevant to fungal cell membrane formation. Experimental data revealed that the imine derived from para-aminophenol and benzaldehyde exhibited the most potent antioxidant activity (IC_{50} = 15.12 µg/mL) while maintaining excellent hemocompatibility. Antifungal spot assays demonstrated a dose-dependent inhibitory effect against *S. cerevisiae*, with the imine derived from alanine and salicylaldehyde displaying the highest efficacy. Docking studies supported this by confirming a strong binding affinity of -8.3 kcal/mol with Lanosterol 14-α-demethylase. Systemic toxicity screening identified the imine derived from glycine and nitrobenzaldehyde as the most toxic compound (LC_{50} = 49.98 µg/mL), while overall *in silico* profiling (SwissADME, ProTox-3.0) confirmed high gastrointestinal absorption, optimal bioavailability, and broad Class 5 safety across the series. Ultimately, these findings highlight the alanine-salicylaldehyde imine as a promising targeted candidate for antifungal development, and the para-aminophenol-benzaldehyde imine as a viable biocompatible antioxidant.

Keywords:

Schiff bases; Molecular docking; Antioxidant activity; Biocompatibility; Lanosterol 14-α-demethylase.

Abstract No: 2025_349

Synthesis and spectroscopic characterization of novel sulfonamide-based picolylamine ligands and their platinum(II) complexes towards potential biological applications

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The design and development of platinum(II) complexes remain a focal point in coordination chemistry due to their diverse applications in medicinal inorganic chemistry. Sulfonamide derivatives, in particular, offer versatile coordination environments and biological relevance. Herein, we report the successful synthesis of three new sulfonamide derivatized ligands with a 2-picolylamine moiety: N(SO_2-1-naphthalene)-2-picolylamine (L1), N(SO_2-2-naphthalene)-2-picolylamine (L2), and N(SO_2Me_2Nnap)-2-picolylamine (L3). These ligands were subsequently utilized to synthesize a series of three novel platinum(II) complexes: *cis*-[PtCl2(N(SO2-1-naphthalene)-2-picolylamine)] complex (C1), *cis*-[PtCl2(N(SO2-2-naphthalene)-2-picolylamine)] complex (C2), and *cis*-[PtCl2(N(SO2Me2Nnap)-2-picolylamine)] complex (C3). The structural properties of both the free ligands and the resulting metal complexes were comprehensively elucidated using spectroscopic techniques. X-ray crystallographic data revealed the crystal system of L3 ligand to be monoclinic, and the space group is P21/n. Fourier Transform Infrared (FTIR) spectroscopy confirmed the coordination of the ligands to the platinum center, specifically highlighting shifts in the S-N stretching frequencies which appear at lower wavenumbers compared to that of the corresponding free ligands. ^{1}H NMR spectral data provided detailed insights into the proton environments, showing characteristic downfield shifts upon complexation with the Pt(II) metal center. Furthermore, UV–Visible spectrophotometric measurements of all three Pt(II) complexes show a hypsochromic shift compared to the corresponding free ligands in the absorption spectra in methanol. These results collectively confirm the successful bidentate coordination of the picolylamine-sulfonamide scaffold to the platinum(II) center in a cis configuration. *In silico* Swiss target predictions suggest that human cyclooxygenase-2 as a potential target for L1, L2 and L3 ligands. This study may offer a pathway for further investigation into their potential biological applications such as anticancer and anti-inflammatory properties.

Keywords:

platinum complexes; 2-picolylamine; sulfonamide; anti-cancer; cyclooxygenase-2

Acknowledgment:

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Abstract No: 2025_351

Bioactivity and preliminary composition evaluation of hot water extract from *Trametes coccinea*

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Polysaccharides from medicinal mushrooms are promising bioactive compounds with potential therapeutic applications. This study characterized the chemical composition and bioactivity of hot water (HW) extract and its deproteinized (DP) fraction of *Trametes coccinea*, a species authenticated using genome sequencing. The mushroom residue remaining after sequential solvent extraction (petroleum ether, ethyl acetate, methanol, 50% methanol, and water) was further extracted with hot water and deproteinized using the Sevag method. Deproteinization enriched the polysaccharide fraction, increasing total carbohydrate content from 46.04% (HW) to 56.36% (DP) while reducing protein content from 154.58 µg/mL to 69.95 µg/mL. The HW and DP extracts exhibited antioxidant potential across multiple *in vitro* assays. The DPPH radical scavenging IC_{50} values were 853.20 µg/mL and 1397.79 µg/mL, respectively, while ABTS IC_{50} values were 296.52 µg/mL and 262.21 µg/mL. The FRAP assay indicated a concentration-dependent ferric reducing antioxidant power for both extracts. Total antioxidant capacity was recorded as 675.15 and 485.00 mg GAE/g for HW and DP extracts, respectively. The DP extract showed enhanced biological activity, with stronger inhibition of egg albumin denaturation (68.22% at 4000 µg/mL) compared to HW (33.26% at 4000 µg/mL), and higher α-amylase inhibition (53.3% vs. 43% at 8000 µg/mL). Safety evaluation using the Brine Shrimp Lethality Assay (BSLA) indicated that both extracts were non-toxic (LC_{50} > 1,000 ppm). TLC analysis of acid-hydrolyzed samples identified galactose as the primary monosaccharide, with no other sugars detected under the applied conditions. FTIR analysis confirmed the presence of polysaccharide functional groups and indicated successful removal of protein components after deproteinization while preserving the polysaccharide backbone. Overall, *T. coccinea* is a safe and potent source of galactose-rich polysaccharides with anti-inflammatory and enzyme inhibitory properties, highlighting its potential for functional food or nutraceutical applications.

Keywords:

Trametes coccinea; Polysaccharides; Deproteinization; Hot water extract

Abstract No: 2025_352

Development of low-cost silica gel from rice husk ash for thin layer chromatography (TLC)

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This study investigates the synthesis of sustainable, rice husk ash-derived silica gel for use as the stationary phase in the thin-layer chromatography (TLC) technique. Commercially available silica used for TLC is considerably costly, as it is derived from non-renewable sources and also involves complex manufacturing processes. Therefore, the objective of this research was to produce fluorescent material-incorporated TLC material at a low cost for use in teaching laboratories. We have developed a new methodology by modifying the conventional sol-gel process for extracting silica from rice husk. Rice husk ash was acid-treated using 1 M HCl under controlled conditions, and silica (SiO_2) was prepared by reacting the acid-treated ash with 3 M NaOH under microwave heating, followed by precipitation using 1 M HCl to adjust the pH to 2.5, and then again neutralizing the solution using 1 M NaOH. The resulting silica gel was aged, filtered, and dried. The dried mass was ground into fine powder, resulting in an average silica yield of 87.14 %. For TLC applications, a fluorescent material synthesized from manganese-doped zinc silicate was incorporated to enable the visualization of colorless solutes under UV illumination, and $CaSO_4$ was added to serve as the binder. The incorporation process was optimized using sonication to ensure uniform distribution of the fluorescent material. The silica mixture was evenly applied to the glass plate and dried in an oven at 110 °C. Characterization of the synthesized material was performed using Fourier Transform Infrared (FTIR) spectroscopy to confirm the chemical composition and bonding. The modified TLC silica provided accurate Rf values and facilitated effective visualization of compounds like anthracene, 2-naphthol, and benzaldehyde. These findings confirm that rice husk ash-derived TLC silica offers an eco-friendly and cost-effective alternative to commercial TLC silica.

Keywords:

Manganese-doped zinc silicate, Rice husk ash, Sol-gel method, Thin-layer chromatography.

Abstract No: 2025_353

First principle computational modeling of electronic and structural properties of zeolites by using periodic DFT

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Zeolites are microporous, crystalline, hydrated aluminosilicate minerals known for their function as "molecular sieves." They are widely used for ion exchange, adsorption, and catalysis. In the present study, the main focus was on calculating electronic and structural properties of zeolite frameworks using periodic DFT. The unit cells of LTA, FAU, MER, and CHA type zeolites were used, and all the calculations were performed by using the Quantum ESPRESSO software package. To obtain a structure consistent with the DFT-PBE functional, all the frameworks of unit cells were relaxed by doing full variable relaxation (vc-relax) calculations. The plane-wave kinetic energy cutoff (ecutwfc) and the k-point grid sampling of the Brillouin zone were converged, exchange-correlation interactions were treated within the generalized gradient approximation (GGA) using the Perdew-Burke Ernzerhof (PBE) functional. Electron-ion interactions were described using pseudopotentials that were taken from the Quantum Espresso pseudopotential library. To obtain the electronic density of state (DOS) and band structure with high resolution, a non-self-consistent field (NSCF) calculation was performed. Phonon calculations were performed on the LTA zeolite to determine the theoretical IR vibrational modes. Optimized Si-O bond lengths were located in 1.60 Å – 1.62 Å range, Si-O-Si bond angles ranged from 149^0 to 151^0, The band gap values of LTA, FAU, MER and CHA zeolite types are 5.48 eV, 5.56 eV, 5.64 eV and 5.92 eV respectively. The Si-O-Al symmetric vibrations appeared at 665 cm^{-1}, Si-O-Si asymmetric vibrations were located at 926 cm^{-1}. The theoretical and experimental unit-cell dimensions, band gaps, are located within the acceptable range. Theoretical IR vibrational frequencies were in agreement with experimental values. These findings confirm that integration of periodic DFT calculations adds a powerful theoretical dimension to the study of properties of zeolite frameworks.

Keywords:

Zeolite, Electronic structure, Structural properties, Density functional theory (DFT), Quantum ESPRESSO

Abstract No: 2025_354

Evaluation of antioxidant and antidiabetic activities of Megha Vac Recovery and Megha Primal Intake: An *in vitro* study for newly formulated herbal-based food supplements

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Megha Vac Recovery (MVR) and Megha Primal Intake (MPI), herbal-based food supplements, have recently been introduced to bolster the immune system and provide enhanced health benefits. They contain Ginger, Garlic, Coriander, Sweet Flag, Malabar Nut, and Holy Basil, with Cocoa in MVR. This investigation evaluates the antioxidant and antidiabetic properties of the water (WE) and ethanol (EE) extracts of MVR and MPI capsules. The extracts were analyzed for total phenolic and flavonoid contents, as well as antioxidant and antidiabetic activities. MVR demonstrated a higher ($p < 0.05$) total phenolic content of 1.84 ± 0.19 mg/g (gallic acid equivalents, GAE) in WE, along with a total flavonoid content of 4.26 ± 0.09 mg/g (catechin equivalents, CE). In contrast, MPI exhibited 1.28 ± 0.07 mg/g GAE of phenolics and 3.0 ± 0.13 mg/g CE of flavonoids. Compared to the positive control, ascorbic acid, the WE of both capsules displayed moderate antioxidant activity, with IC_{50} values of 6.33 ± 0.35 µg/mL for MVR and 7.67 ± 0.58 µg/mL for MPI in the DPPH (2,2-diphenyl-1-picrylhydrazyl) assay, while EE showed lower activity. In the ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid)) assay, both capsules showed moderate effectiveness in scavenging ABTS radicals. In the FRAP (Ferric Reducing Antioxidant Power) assay, EE showed higher reducing power than WE. The WE of MVR showed potent antidiabetic activity with an IC_{50} of 12.62 ± 1.11 µg/mL in the α-amylase inhibition assay. Compared to acarbose (17.18 ± 0.26 µg/mL), the positive control, WE of MPI, and EE of both capsules exhibited higher IC_{50} values, indicating moderate α-amylase inhibitory activity. In the α-glucosidase inhibition assay, WE of MVR (71.59 ± 2.65 µg/mL) and EE of MPI (44.90 ± 2.64 µg/mL) showed lower IC_{50} values than acarbose (153.48 ± 3.81 µg/mL), indicating stronger α-glucosidase inhibition. These findings indicate that MVR and MPI possess moderate antioxidant activity and notable antidiabetic potential. Among them, MVR with higher phenolics showed greater potential to inhibit α-amylase and α-glucosidase, thereby delaying carbohydrate digestion.

Keywords:

Herbal food supplement; Natural products; Megha Vac Recovery; Megha Primal Intake

Acknowledgement:

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Abstract No: 2025_355

Comparative analysis of the main plant components of Megha Vac Recovery and Megha Primal Intake for their antidiabetic and antioxidant potential

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Megha Vac Recovery (MVR) and Megha Primal Intake (MPI) food supplements contain several plant components, including Ginger (*Zingiber officinale*), Garlic (*Allium sativum*), Coriander (*Coriandrum sativum*), Sweet Flag (*Acorus calamus*), Malabar Nut (*Justicia adhatoda*), Holy Basil (*Ocimum sanctum*), and Cocoa (*Theobroma cacao*), with cocoa included only in MVR. This study aims to evaluate the contributions of these individual plants to the supplements' antioxidant and antidiabetic properties. Water (WE) and ethanol extracts (EE) of the plants were analyzed for phytochemical content, antioxidant, and antidiabetic activities. All experiments were performed in triplicate, and one-way analysis of variance (ANOVA) was used for statistical significance. Among the plants, cocoa showed the highest ($p < 0.05$) phenolic content, with 5.96 ± 0.19 mg/g (gallic acid equivalents, GAE) in WE and 7.28 ± 0.26 mg/g GAE in EE. Other plants had comparatively lower phenolics, and similar patterns were observed for flavonoid and condensed tannin levels. In antioxidant tests, WE of sweet flag, ginger, and cocoa had IC_{50} below 5 µg/mL in the DPPH (2,2-diphenyl-1-picrylhydrazyl) assay, slightly higher than the positive control, ascorbic acid (3.38 ± 0.11 µg/mL), indicating strong antioxidant potential. In the ABTS (2,2′-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid)) assay, all plants showed less than 40% inhibition of ABTS radicals at 1 mg/mL concentration. Regarding antidiabetic activity, WE of all plants showed higher IC_{50} values for α-amylase inhibition compared to acarbose (17.18 ± 0.26 µg/mL). However, EE of cocoa, garlic, and holy basil had IC_{50} values of 8.16 ± 0.38 µg/mL, 13.18 ± 0.68 µg/mL, and 16.62 ± 1.52 µg/mL, respectively, demonstrating stronger α-amylase inhibitory effects. Except for EE of sweet flag, garlic, and WE of cocoa, others exhibited stronger α-glucosidase inhibition than acarbose (153.48 ± 3.81 µg/mL). These findings show that Cocoa exhibited the highest phytochemical content among all plants studied. Overall, these plant components displayed moderate antioxidant activity and notable antidiabetic potential, contributing to the effectiveness of the food supplements.

Keywords:

Antidiabetic activity; Antioxidant activity; Plants; Supplements

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Cross-sectional analysis of anthropometric parameters and plasma glucose in a sample of undergraduate students at the Institute of Chemistry Ceylon

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Non-communicable diseases (NCDs) are closely linked to obesity, fat distribution, and glucose regulation, yet early metabolic disturbances in young adults remain understudied. This cross-sectional study examined anthropometric parameters, fasting blood sugar (FBS), and body composition among 80 undergraduates (26 males, 54 females) at the Institute of Chemistry Ceylon, to identify gender differences and associations among measured variables. Anthropometric measures included body mass index (BMI), waist and hip circumference, and skinfold thickness, while body composition was assessed by bioelectrical impedance analysis. FBS was measured using a colourimeter based on the glucose oxidase assay. Data were analyzed using descriptive statistics, independent-sample t-tests, ANOVA, and Pearson correlation analysis. Males demonstrated a higher mean BMI (25 ± 5 kg/m²) compared to females (23 ± 4 kg/m²). Based on the WHO classification, 34.7% of participants were overweight and 6.7% underweight. Waist-to-hip ratio and visceral fat were significantly higher in males, whereas females had greater skinfold thickness and subcutaneous fat. Compared to females, males had lower body fat percentage (25 ± 6% vs 33 ± 5%) and lower subcutaneous fat (18 ± 4% vs 27 ± 5%), a higher resting metabolic rate (1610 ± 239 vs 1214 ± 129 kcal), higher visceral fat (9 ± 5 vs 4.5 ± 3), and higher skeletal muscle percentage (31 ± 2% vs 25 ± 2%) ($p < 0.05$). However, fasting blood sugar measured by the colourimeter did not differ significantly between males and females (85 ± 9 mg/dL vs 86 ± 12 mg/dL). Pearson correlations showed strong positive associations between BMI and visceral fat ($r = 0.992$ in males; $r = 0.971$ in females) and between BMI and RMR ($r = 0.886$ in males; $r = 0.908$ in females). Skinfold thickness correlated with subcutaneous fat in females, while FBS was not significantly correlated with anthropometric or body composition measures.

Keywords:

Anthropometry, Body composition, Body Mass Index (BMI), Fasting blood glucose (FBS), Resting metabolic rate (RMR)

Abstract No: 2025_357

Comparative analysis of vitamin C,dietary fiber and selected mineral content of fresh and commercially available fruit juices

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Vitamin C (ascorbic acid), dietary fiber, and minerals such as potassium and sodium are important nutritional components of fruit juices. However, their levels vary between fresh and commercially processed juices due to dilution, fortification, pasteurization, and storage. This study compared moisture content, vitamin C, dietary fiber, and selected minerals in freshly prepared and commercially available fruit juices to evaluate the variations. Vitamin C was determined using iodometric titration, dietary fiber by enzymatic-gravimetric analysis, moisture by oven drying, and potassium and sodium by Atomic Absorption Spectroscopy (AAS). Moisture content was highest in fresh watermelon (92.13%) and papaya (92.73%), while commercial mango and orange nectars showed lower values (82–83%) due to added solids and concentration. Fresh orange juice had the highest vitamin C content (35.03 mg/100 mL), whereas fresh watermelon had the lowest (4.07 mg/100 mL). Commercial nectars generally exhibited higher vitamin C levels than absolute juices as a result of fortification. Dietary fiber content was highest in fresh orange juice (0.84% w/w) but was substantially reduced in clarified commercial juices (< 0.3% w/w). In contrast, mango nectars retained higher fiber content (2.65% w/w) due to pulp retention and stabilizers. Potassium was the predominant mineral, ranging from 4.99 mg/g in commercial mango juice to 51.36 mg/g in commercial orange juice. Sodium levels were negligible in fresh juices (<0.19 mg/100 mL) but increased in commercial products, reaching 32.50 mg/g in commercial orange juice and 12.96 mg/g in commercial mango juice. Among fresh fruits, passion fruit contained the highest potassium level (10.44 ± 0.01 mg/g), while watermelon had the lowest (2.46 ± 0.01 mg/g). Red apple showed the highest sodium content (6.71 ± 0.01 mg/g). Overall, the study demonstrates that commercial processing significantly alters the nutritional profile of fruit juices, highlighting the superior nutritional quality of free juices and the need for consumer awareness and appropriate regulation.

Keywords:

vitamin C, dietary fiber, potassium, sodium, fruit juice, processing

Acknowledgment:

I would like to express my sincere gratitude to my supervisor, Sagarika Ekanayake and co-supervisor, Keerthi Attanayake for their invaluable guidance and support throughout this research. I also extend my appreciation to the staff, colleagues, family, and friends whose encouragement and assistance contributed greatly to the successful completion of this study.

Abstract No: 2025_360

Synthesis of 2-phenyl-3*H*-quinazolin-4-one derivatives and *in vitro* and *in silico* evaluation as potential antidiabetic agents *via* α-amylase inhibition and glucose uptake in yeast cells

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Diabetes mellitus is a common endocrine disorder characterized by hyperglycemia, which is increasing steadily all over the world. Current medications have limitations due to lower efficacy and side effects. Thus, the introduction of novel compounds is crucial. The main objective of this study is to synthesize 2-phenyl-3*H*-quinazolin-4-one and its derivatives (4-OH, 3-OH, 2-OH, 4-F, 4-Cl, 4-OCH_3, 2-OCH_3, 4-NO_2, 3-NO_2, 2-NO_2, 2.4-diOCH_3, 2.5-diOCH_3, 3,4,5-triOCH_3, and 3-OCH_3-4-OH) and evaluate their alpha amylase inhibitory activities and glucose uptake across the cell membrane in the yeast cell *in vitro* and *in silico*. The synthesis was carried out by oxidative cyclocondensation of 2-aminobenzamide with the corresponding benzaldehyde in an iron (III) chloride solution. The structures of the derivatives were confirmed by spectroscopic techniques, including FTIR, NMR, and HRMS. The quinazolinone core structure possesses multiple pharmacological properties, such as antioxidant, anti-inflammatory, antimicrobial, antifungal, anticancer, and antidiabetic properties. The similarity of the structure to that of other known antidiabetic drugs due to the presence of carbonyl, amine, and amide groups enhances its anti-diabetic properties. Results from glucose uptake by yeast showed that 2-(4-methoxyphenyl)-3*H*-quinazolin-4-one had the lowest 50% uptake value of 24.02 ± 0.96 mM, compared with the standard drug metformin (25.99 ± 2.41 mM). The alpha-amylase inhibitory assay showed that 2-(2-methoxyphenyl)-3*H*-quinazolin-4-one exhibited potent inhibition, with an IC_{50} of 0.42 ± 0.05 mM, compared with the standard drug acarbose (0.53 ± 0.05 mM). Docking results revealed that 2-(4-nitrophenyl)-3*H*-quinazolin-4-one has a stronger binding affinity to the GLUT2 protein with a binding energy of -9.6 kcal/mol. The compounds 2-(4-hydroxyphenyl)-3*H*-quinazolin-4-one and 2-(3-nitrophenyl)-3*H*-quinazolin-4-one have the highest binding affinity for the amylase enzyme, with -8.2 kcal/mol among the synthesized derivatives. These findings suggest that synthesized 2-phenyl-3*H*-quinazolin-4-one derivatives are promising candidates for diabetes mellitus. Further, it suggests that more research is required to validate the efficacy, toxicity, and mechanisms of action of these compounds.

Keywords:

Diabetes mellitus, 2-phenyl-3*H*-quinazolin-4-one, Glucose uptake by yeast, alpha amylase

Abstract No: 2025_362

Effect of processing on antioxidant activity and phytochemical constituents of green, white, and black tea and tea flowers (*Camellia sinensis*)

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Tea (*Camellia sinensis*) is one of the most widely consumed beverages. This study evaluated the antioxidant activity and phytochemical constituents of different tea varieties based on their manufacturing processes. Four groups of tea samples (15 samples) were selected; comprising green tea (5 samples), white tea (3 samples), black tea (6 samples), and a tea flower infusion and further differentiated into flavored and unflavored varieties. Methanolic extracts were prepared and analyzed for antioxidant activity using the DPPH free radical scavenging assay. Total phenolic content (TPC) was determined using the Folin–Ciocalteu method while total flavonoid content (TFC) was measured using the $AlCl_3$ method. The major classes of bioactive compounds in tea, including alkaloids, flavonoids, polyphenols, tannins, saponins, terpenoids, carbohydrates, reducing sugars, steroids, and resins, were qualitatively analyzed using standard phytochemical screening tests. The DPPH assay, was highest activity in green tea with cinnamon (72.02%), followed by pure green tea (71.36%) and silvertip tea (70.05%). In TPC, the highest values were recorded in green tea with citrus (200.2 mg GAE/g extract), gunpowder tea (199.97 mg GAE/g extract), and organic green tea (165.4 mg GAE/g extract). The highest TFC values were observed in gunpowder tea (105.08 mg QE/g extract), followed by black tea curl (57.33 mg QE/g extract), and pure green tea and decaffeinated tea (53.08 mg QE/g extract). Overall, the results indicate that green tea varieties including flavored blends and pure green tea and minimally processed white tea exhibit higher antioxidant activity and greater phytochemical content compared with black tea. Among the samples analyzed, gunpowder tea, pure green tea, and cinnamon green tea demonstrated the strongest antioxidant potential. These findings highlight the significant influence of tea processing on phytochemical composition and antioxidant potential, identifying certain tea varieties as rich sources of bioactive compounds.

Keywords:

Tea (*Camellia sinensis*), Antioxidant activity, DPPH radical scavenging assay, TPC, TFC

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Abstract No: 2025_363

Cytotoxic and antioxidant activities of some marine sponges from Sri Lanka evaluated by brine shrimp lethality test (BSLT) and DPPH assay

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Marine sponges are widely recognized as prolific sources of bioactive secondary metabolites with significant pharmacological potential. Despite documented sponge biodiversity along Sri Lankan coastlines, specimens from the Southern coast remain largely uncharacterised, representing a geographically distinct and unexplored chemical resource compared to previously studied Indo-Pacific populations. This study evaluated the cytotoxic and antioxidant activities of nine crude extracts from marine sponges collected at Kudawella, Southern Sri Lanka. Nine specimens were collected by scuba diving and morphologically identified to genus level. Sequential crude extracts were prepared by maceration in methanol, dichloromethane, and hexane 0.12% to 2.87% (w/w dry weight). Cytotoxic activity was assessed using the Brine Shrimp Lethality Test (BSLT) with Artemia salina nauplii (n=3 triplicates per extract) using potassium dichromate as positive control and artificial sea water as the negative control, and LC_{50} values were determined by probit regression (Finney's method). Antioxidant activity was evaluated by the DPPH free radical scavenging assay. BSLT revealed high cytotoxicity in *Clathria* sp. (S02; LC_{50} = 14.03 ± 1.2 ppm) and *Axinella* sp. (S05; LC_{50} = 36.18 ± 2.1 ppm and S04; LC_{50} = 57.54 ± 1.8 ppm), while *Suberites* sp. (S01; LC_{50} = 407.38 ± 23.5 ppm and S03; LC_{50} = 475.34 ± 28.4 ppm) showed moderate toxicity. *Halichondria* sp. (S06) and *Clathria* sp. (S09) were low toxic (LC_{50}= 583.45 ± 35.1 ppm and 863.38 ± 51.8 ppm respectively) and order Tethyida specimens were non-toxic. DPPH assays indicated generally low antioxidant activity across extracts, with the highest scavenging observed in Order Tethyida (S07; %FRSA = 14.55 ± 0.9%), well below reference standards (ascorbic acid: 86.85%; BHT: 73.83%). These findings identify *Clathria* sp. and *Axinella* sp. as priority candidates for further bioassay-guided fractionation, characterization, and cell-line-based studies, supporting the exploration of Sri Lankan coastal sponges as potential sources of novel marine-derived pharmaceutical compounds.

Keywords:

Marine sponges, Cytotoxic activity, Brine Shrimp Lethality Test (BSLT), Antioxidant activity

Abstract No: 2025_364

GC–MS based fatty acid profiling and multivariate analysis of rice bran oil from traditional Sri Lankan rice varieties

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Rice bran oil extracted from twenty traditional Sri Lankan rice varieties was analysed to evaluate variations in fatty acid composition and nutritional quality using GC–MS and multivariate statistical analysis. Rice bran samples were subjected to Soxhlet extraction using petroleum ether followed by preparation of fatty acid methyl esters (FAMEs) and GC–MS analysis. All analyses were performed in quadruplicate to ensure data reliability. The major fatty acids identified were oleic acid (44.19%), linoleic acid (28.11%), and palmitic acid (19.90%), while stearic acid, α-linolenic acid, and several long-chain fatty acids were detected in minor quantities. The overall fatty acid distribution comprised 25.26% saturated fatty acids (SFA), 44.77% monounsaturated fatty acids (MUFA), and 29.00% polyunsaturated fatty acids (PUFA), indicating a favorable nutritional lipid balance in the analysed rice bran oils. Principal component analysis (PCA) revealed compositional variation among the rice varieties, with the first two principal components explaining 59.5% of the total variance. Hierarchical cluster analysis classified the varieties into three groups mainly according to differences in oleic, linoleic, and palmitic acid contents, while discriminant function analysis further supported the observed group separation. Although the rice varieties exhibited broadly similar fatty acid profiles, multivariate analysis identified comparatively distinct compositional patterns among several varieties. These findings demonstrate the usefulness of multivariate statistical approaches for differentiating traditional Sri Lankan rice varieties and highlight the nutritional potential of selected varieties as sources of high-quality edible oils.

Keywords:

Rice bran oil, fatty acid composition, GC–MS, multivariate analysis, traditional rice varieties

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Abstract No: 2025_365

In vitro antidiabetic activity of the leaf extract of *Dillenia retusa Thunb.*

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Dillenia retusa Thunb. (Dilleniaceae) is an endemic Sri Lankan medicinal plant traditionally used to treat various ailments, including fever, nervous system disorders, oral diseases, anorexia, excessive thirst, dysentery, cough, burning sensations, and to promote hair health. Several species of the genus *Dillenia* have been reported in Sri Lankan traditional medicine for the management of diabetes mellitus. However, the antidiabetic potential of *D. retusa* has not been scientifically investigated. In the present study, sequential leaf extracts and bioassay-guided chromatographic fractions of the *D. retusa Thunb* ethanolic leaf extract were evaluated for antidiabetic activity using α-amylase and α-glucosidase inhibition and enhancement of cellular glucose uptake in a yeast-based model system. Mature fresh leaves were collected from Gampaha District, Sri Lanka, and authenticated. Dried leaves were subjected to sequential solvent extraction with n-hexane (yield: 5.9% w/w) followed by absolute ethanol (yield: 18.06% w/w). The crude ethanol extract was further fractionated by silica gel column chromatography using gradient elution with n-hexane: ethyl acetate (20:1 followed by 9:1) as the mobile phase. Fractions exhibiting similar TLC profiles were pooled, yielding six major combined fractions with Rf ranges: F_1 (0.82 – 0.92), F_2 (0.75 – 0.85), F_3 (0.68 – 0.78), F_4 (0.58 – 0.72), F_5 (0.52 – 0.65), and F_6 (0.42 – 0.58). In the α-amylase inhibition assay using the starch-iodine colorimetric method, fraction F_1 showed the strongest activity, with an IC_{50} of 0.012 ± 0.006 µg/mL, surpassing acarbose. In the α-glucosidase inhibition assay using p-nitrophenyl-α-D-glucopyranoside as substrate, F_1 again exhibited the most potent activity, with an IC_{50} of 0.327 ± 0.02 µg/mL, exceeding the standard control. In the yeast-based glucose uptake assay performed at 5, 10, and 25 mM glucose concentrations, the extracts significantly enhanced glucose uptake, with effects comparable to or greater than metformin across all conditions. These findings highlight the potential of *D. retusa* leaves as a promising candidate for natural product-based antidiabetic drug discovery, warranting further *in vivo* studies and the isolation of bioactive compounds.

Keywords:

Dillenia retusa Thunb, α-amylase inhibition, α-glucosidase inhibition, glucose uptake, antidiabetic.

Abstract No: 2025_370

Development of a metal composite for the removal of phosphates from aqueous solutions

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This study focused on developing an efficient metal-based composite adsorbent that can remove phosphates from aqueous media. The synthesis of the composite was carried out using a co-precipitation method. Equimolar aqueous solutions of iron (III) nitrate, magnesium sulfate, and zinc sulfate were mixed, and precipitation was controlled by adjusting the pH to 8 using NaOH. The obtained product was aged, filtered, and dried to remove the residual moisture. Characterization of the composite was performed to evaluate the structure, functional groups present, and composition using X-ray diffraction, Fourier Transform Infrared spectroscopy, and Atomic Absorption Spectroscopy. In the preliminary adsorption experiments conducted at an initial phosphate concentration of 100 ppm, pH 6, and a contact time of 1 h, the composite achieved an adsorption capacity of 90.69 mg/g, revealing its rapid and efficient phosphate uptake capability. This enhanced performance of the composite may be attributed to the synergism of metal centers, which provide increased surface area and a greater number of active sites for adsorption. The amorphous nature of the material, as revealed by XRD analysis, may further influence its adsorption behavior. The results suggest that the developed composite exhibits promising potential as an efficient adsorbent for phosphate removal from aqueous solutions. An ongoing study is focused on systematically optimizing key parameters such as pH, contact time, adsorbent dosage, and initial phosphate concentration to improve adsorption performance and support its application in environmental remediation.

Keywords:

phosphate removal, adsorption capacity, metal composites, co-precipitation

Abstract No: 2025_371

Linear vs. non-linear isotherm modeling of interaction of Ni(II) with *Panicum maximum* leaf biosorbent

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The escalating threat of heavy metal contamination in aquatic ecosystems is a critical environmental challenge. As conventional remediation is often costly, biosorption has emerged as an eco-friendly and sustainable alternative. Among natural biomass, fibrous weeds, such as *Panicum maximum* (PM) are considered as promising and efficient materials for targeted metal remediation. The heavy metal, Ni, though being an essential micronutrient, poses severe health risks at elevated discharge concentrations as its divalent form, Ni(II). This study evaluates Ni(II) adsorption on PM leaf biosorbent, in the dry form, by comparing linear and non-linear isotherm models. Batch experiments achieve a 65.2% removal efficiency under optimized conditions at ambient pH. Equilibrium data analyzed using Langmuir, Freundlich, Temkin and Sips adsorption isotherm models demonstrate that non-linear regression provides a much more accurate reflection of error distribution than linear transformations. Interestingly, the adsorption mechanism shifts based on solution acidity: under highly acidic conditions (pH = 3), the non-linear Langmuir model provides the best fit (R^2 = 0.9641, maximum capacity = 1.37 mg g^{-1}), indicating a strict monolayer formation on a uniform surface despite intense competition of hydrated protons. Conversely, at ambient pH (5.87), pH 5, and an elevated 1.0 g dosage, the Temkin (R^2 = 0.9885) and the Freundlich (R^2 > 0.94) isotherm models dominate, indicating a higher mass transfer from the solution phase, initially to form a surface adsorbed layer, which extends toward intra-particle diffusion. The Sips model mathematically supports this; its heterogeneity factor (n) is nearly 1 at pH = 3 but deviates sharply otherwise. The Freundlich intensity values (n) in the range of 2.51 – 3.62 confirm a highly favorable process, while the heat of adsorption of 4.16–9.31 kJ mol^{-1}, obtained by the Temkin isotherm, supports physisorption of Ni(II) on the PM biosorbent. Ultimately, non-linear modeling is essential to understand how Ni(II) is physically attached to the biosorbent.

Keywords:

Biosorption, Freundlich, Langmuir, physisorption

Abstract No: 2025_373

Development of sustained-release hydrogel beads of aspirin

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Aspirin, also known as acetylsalicylic acid (ASA), is a nonsteroidal anti-inflammatory drug (NSAID) with analgesic, antipyretic, anti-inflammatory, and antiplatelet properties, has a short half-life of 15–20 minutes, plasma concentration fluctuations and gastrointestinal adverse effects. Hence, this study aimed to develop and optimize chitosan-coated pectin hydrogel beads for oral sustained-release of aspirin. The pectin beads were prepared by ionotropic gelation method. Optimization was carried out by varying pectin concentration (4%, 5%, 6% w/v), $CaCl_2$ concentration (2% and 5% w/v) and curing time (20 and 60 minutes). The optimal conditions were determined as 5% pectin, 5% $CaCl_2$ and 60 minutes of curing time, which yielded the highest EE% of 74.99% ± 0.09 and LC% of 10.05% ± 0.01. The optimal formulation (F8) was coated with different chitosan concentrations (0.2%, 0.1%, and 0.05%). The 0.05% chitosan concentration was selected as optimal, achieving an 8-hour release profile, with a coating thickness of 11.5 ± 1.0 µm, in contrast to 15 hours and more than 24 hours for the 0.1% and 0.2% concentrations, respectively. FTIR results confirmed the successful loading of the drug and the formation of the polyelectrolyte complex by the peak shifts in the C=O and COO- stretching bands. Furthermore, the SEM images confirmed the successful coating by the presence of a distinct layer with surface roughness, ridges and protrusions on the coated beads, unlike the smooth and spherical shape of the uncoated beads. *In vitro* release studies in individual buffers showed that F8 released aspirin rapidly (70% at pH 1.2 in 4 hours; 74% at pH 6.8 in 3 hours) than F15 (70% at pH 1.2 in 6 hours; 81% at pH 6.8 in 6 hours). Sequential release achieved 100% for F15 in 8 hrs whereas F8 achieved 93% in 5 hrs. Both followed Korsmeyer-Peppas model with super case II in sequential studies and Fickian diffusion in individual buffers, confirming sustained aspirin release with reduced gastrointestinal irritation and improved patient compliance.

Keywords:

Aspirin; pectin hydrogel beads; chitosan coating; sustained-release; ionotropic gelation.

Abstract No: 2025_375

Assessing the efficiency of eggshell – derived calcium oxide nanoparticles on photocatalytic dye degradation and antibacterial activity

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Being one of the major solid wastes, eggshells are known to cause environmental degradation through land fillings, leading to various health issues. This study primarily focuses on synthesizing CaO nanoparticles (NPs) by utilizing waste chicken eggshells, providing a facile approach for waste management. These NPs were synthesized by dissolving powdered eggshells in an acidic medium, adding NaOH in the presence of sodium dodecyl sulfate, followed by drying the resulting product. FTIR analysis exhibited a characteristic peak at 501.4 cm–1 which indicates the Ca—O stretching vibrations suggesting the formation of CaO NPs under applied conditions. XRD study revealed intense peaks at 18.06°, 29.39°, 31.72°, 34.07°, and 47.10° corresponding to (111), (200), (110), (211), and (220) Miller indices, respectively, suggesting these NPs are in cubic phase. Based on the Debye-Scherrer equation, average crystallite size was calculated to be ~67.1 nm indicating they are in the nano-range. However, SEM analysis revealed irregular shaped morphology possibly due to agglomeration which could be controlled by using a better capping agent. To assess the potential of these CaO NPs on photodegradation of Methylene Blue (MB) dye, an experiment was carried out under optimum conditions of pH 11 with a dye concentration of 5 ppm and a catalytic load of 10 mg over a period of 120 minutes. Under these conditions, a maximum photodegradation of 92.85% was observed, which is 22.10% higher than that of the control, a MB solution under similar conditions but without adding NPs. Further, antimicrobial activity of the synthesized NPs against Gram-negative *Escherichia coli* and Gram-positive *Staphylococcus aureus* were studied using agar disc diffusion method using different NP concentrations of 1 mg/mL, 2 mg/mL, 4 mg/mL, 6 mg/mL, 8 mg/mL, and 10 mg/mL. Among them, clear inhibition zones with minimum inhibition concentrations of 10 mg/mL and 8 mg/mL were observed for *E. coli* and *S. aureus*, respectively, suggesting their strong antibacterial activity. Overall, this study highlighted the potential of utilizing common household waste products to synthesize nanomaterials that have the ability to act as environmental remediation agents against certain textile dyes and pathogenic bacterial strains, providing a facile approach for environmental sustainability.

Keywords:

CaO nanoparticles; sol-gel method; photocatalytic activity; antibacterial activity.

Abstract No: 2025_377

Regulatory-compliant comparative *in vitro* dissolution evaluation of immediate-release paracetamol tablets under BP 2024 and ICH M9 biowaiver framework

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Three commercially available immediate-release paracetamol 500 mg tablet formulations were subjected to a systematic comparative *in vitro* dissolution study using a validated UV–visible spectrophotometric method, in compliance with the British Pharmacopoeia (BP 2024) and ICH M9 regulatory requirements, to assess dissolution performance and biowaiver eligibility. USP Apparatus II (paddle method) was operated at 50 rpm in 900 mL of physiologically relevant media (pH 1.2, 4.5, and 6.8) at 37 ± 0.5 °C, with six tablets per formulation per medium (n = 6). Samples were collected at 15, 30, and 45 minutes. All formulations satisfied the ICH M9 criterion for rapid dissolution, surpassing 85% dissolution within 15 minutes across all media, with minimum values exceeding 93%, thereby eliminating the requirement for similarity factor evaluation. Although f_2 evaluation was not required, computed similarity factor (f_2) values additionally confirmed a high degree of dissolution similarity, ranging from 85.31 (Reference product vs. Test product 2 at pH 6.8) to 99.31 (Reference product vs. Test product 1 at pH 1.2). Inter-tablet variability was low, with % RSD values below 1.50 % at all time points (15, 30, and 45 minutes), demonstrating consistent manufacturing quality across formulations. Minor differences observed at the 15-minute time point did not result in significant divergence in overall dissolution behavior. This study provides experimental evidence that all tested formulations satisfy BP 2024 dissolution specifications and meet the regulatory criteria for BCS-based biowaiver eligibility under ICH M9. These findings demonstrate regulatory-compliant dissolution similarity among the tested formulations and support evidence-based pharmaceutical quality assessment in the Sri Lankan market.

Keywords:

Paracetamol; dissolution; ICH M9; biowaiver; similarity factor

Abstract No: 2025_378

Targeting NPC1L1-mediated cholesterol absorption with *Woodfordia fruticosa* phytochemicals: A computational investigation via molecular docking, MD simulation, and ADMET profiling

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The Niemann-Pick C1-Like 1 (NPC1L1) protein is a key mediator of intestinal cholesterol absorption and a validated pharmacological target for the management of hypercholesterolemia. This study evaluated multiple phytochemicals derived from the traditional medicinal plant *Woodfordia fruticosa* including kaempferol 3-O-glucoside, kaempferol, ellagic acid, gallic acid, linoleic acid, hexadecanoic acid, and γ-sitosterol. Following the geometry optimization of all considered phytochemicals, their potential as NPC1L1 inhibitors was investigated through an integrated computational approach comprising molecular docking, 25 ns molecular dynamics (MD) simulation, and ADMET profiling. Binding affinities, complex stability, and pharmacokinetic properties of the candidate compounds were assessed relative to Ezetimibe, the clinically approved NPC1L1 inhibitor used as the reference standard. Molecular docking revealed that kaempferol 3-O-glucoside and γ-sitosterol exhibited superior binding affinities relative to Ezetimibe (−9.110 kcal/mol; Ki = 190 nM). Kaempferol 3-O-glucoside demonstrated the highest binding affinity (−9.529 kcal/mol; Ki = 100 nM), followed by γ-sitosterol (−9.323 kcal/mol; Ki = 148 nM). Interaction analysis revealed that γ-sitosterol occupies the same pharmacological binding site as Ezetimibe, engaging the conserved residue triad THR187, PHE532, and MET543. This competitive binding at the receptor interface suggests a direct mechanism for impeding intestinal cholesterol absorption by physically blocking the transport channel. MD simulations confirmed the stability of NPC1L1–ligand complexes over the full simulation trajectory, evidenced by sustained structural compactness, preservation of native protein conformation, and consistent hydrogen bond retention. ADMET profiling further indicated favorable pharmacokinetic characteristics, including absence of blood–brain barrier permeability and lack of P-glycoprotein substrate recognition. Collectively, these findings identify kaempferol 3-O-glucoside and γ-sitosterol from *Woodfordia fruticosa* as computationally validated, structurally stable inhibitors of the NPC1L1-mediated cholesterol absorption pathway. The strong binding profiles and favorable drug-likeness of these phytochemicals provide a robust molecular rationale for their further *in vitro* and *in vivo* validation as candidates of natural therapeutics for hypercholesterolemia.

Keywords:

NPC1L1 transporter, Hypercholesterolemia, Molecular docking, Molecular dynamics simulations

Acknowledgement:

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Abstract No: 2025_379

Unlocking computational screening of *Centella asiatica* phytochemicals as dual COX-2 and P2X3 inhibitors

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Migraine is a debilitating neurological disorder involving neurogenic inflammation and trigeminal nociceptor activation, with cyclooxygenase-2 (COX-2) and P2X3 receptors. Although a variety of synthetic drugs are available for migraine treatment, their long-term use has been associated with several adverse effects and therapeutic limitations, as reported in recent studies. Consequently, there is growing interest in identifying naturally occurring phytochemicals as safer and effective therapeutic alternatives. *Centella asiatica* is a medicinal plant, rich in flavonoids and triterpenoids and offers a promising multi-target therapeutic candidate. Owing to its therapeutic potential, *Centella asiatica* was investigated as a promising source of anti-migraine compounds. Nine phytochemicals were evaluated as dual COX-2 and P2X3 inhibitors. Molecular docking was performed against the ibuprofen-binding site of COX-2 and the ATP-binding site of P2X3. Binding cavity analysis and ADMET profiling were conducted to assess the suitability of selected phytochemicals as a potential drug candidate study. Kaempferol, quercetin, rutin and chlorogenic acid exhibited the strongest binding COX-2 (−7.9 kcal/mol), sharing key residues with same as ibuprofen reference. For P2X3 ursolic acid (−8.6 kcal/mol), rutin (−8.2 kcal/mol), and chlorogenic acid (−8.1 kcal/mol) exhibited the highest affinities, overlapping with ATP-contact residues. Kaempferol emerged as the most drug-like candidate complying with Lipinski's rule, showing high gastrointestinal absorption, bioavailability (0.55), low toxicity (LD_{50}: 3919 mg/kg, class 5), and good synthetic accessibility (3.14). Quercetin had a similar profile but exhibited lower LD_{50} (159 mg/kg, class 4) and potential catechol toxicity. Rutin exhibited lower gastrointestinal absorption, while ursolic acid showed higher gastrointestinal absorption, both ursolic acid and rutin displayed Lipinski violations and poor solubility. Overall, the findings suggest that kaempferol is the most promising anti-migraine lead compound among the *Centella asiatica* phytochemicals evaluated in this study, warranting further computational studies including molecular dynamics simulations, and experimental validation to confirm its therapeutic potential and underlying mechanism of action.

Keywords:

Migraine, *Centella asiatica*, Phytochemicals, Molecular docking, ADMET.

Acknowledgement:

Financial assistance by Department of Chemistry, University of Kelaniya, Sri Lanka.

Abstract No: 2025_382

In vitro antifungal activity of *Senna alata*, *Syzygium cumini*, and *Aloe vera* extracts against *Colletotrichum gloeosporioides* causing mango anthracnose

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Solvent-partitioned fractions from leaves of *Senna alata*, seeds of *Syzygium cumini*, and outer peels of *Aloe vera* were evaluated for antifungal activity against *Colletotrichum gloeosporioides*, the causal agent of mango anthracnose, as eco-friendly alternatives to conventional synthetic fungicides. Powdered plant materials were subjected to cold maceration in 70% ethanol (1:10 w/v, 142 rpm, 25 ± 2 °C, 24 h) and fractionated by sequential solvent–solvent partitioning using hexane, ethyl acetate, and n-butanol. Antifungal efficacy was assessed using an in vitro spore germination inhibition assay at concentrations of 50, 125, 250, and 500 µg/mL, with Mancozeb as the positive control. Data were analysed using a General Linear Model (GLM) with Tukey's post-hoc test ($p < 0.05$). Antifungal activity was significantly influenced by both solvent polarity and extract concentration ($p < 0.001$). Ethyl acetate fractions demonstrated the highest spore germination inhibition across all three botanical sources. *Syzygium cumini* achieved near-complete inhibition of 99.12 ± 1.48% at 500 µg/mL, statistically comparable to Mancozeb, followed by *Senna alata* (98.23 ± 1.55%) and *Aloe vera* (95.58 ± 1.58%). Hexane fractions exhibited the weakest activity relative to ethyl acetate, with inhibition of 82.30 ± 3.07%, 44.25 ± 2.65%, and 55.75 ± 3.07% at 500 µg/mL for *Senna alata*, *Syzygium cumini*, and *Aloe vera*, respectively, indicating that non-polar constituents contribute minimally to overall antifungal efficacy. n-Butanol fractions showed moderate inhibition for *Syzygium cumini* and *Aloe vera*. In contrast, their inhibitory efficacy was notably lower for *Senna alata*, suggesting species-dependent variation in the distribution of potentially active compounds. These results indicate that medium-polar phytochemical fractions, particularly from *Syzygium cumini*, harbour potent antifungal constituents capable of suppressing *Colletotrichum gloeosporioides* spore germination at levels comparable to synthetic fungicide standards. Accordingly, ethyl acetate fractions from the evaluated Sri Lankan botanicals represent promising candidates for developing eco-friendly postharvest anthracnose management strategies.

Keywords:

Colletotrichum gloeosporioides, mango anthracnose, plant extracts, solvent fractionation

Acknowledgement:

Financial assistance by the Industrial Technology Institute, Thalahena, Malabe, Sri Lanka (Treasury Grants).

Abstract No: 2025_387

Biosorption kinetics of the transfer of Cd(II) ions from aqueous solution on powdered *Dillenia suffruticosa*

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Cadmium is a toxic heavy metal that is extensively present in the environment, contributing to water pollution. Sources such as mining activities and cadmium-containing fertilizers lead to its accumulation in the environment, causing severe human health issues, including renal dysfunction, hypertension, and lung damage. Therefore, developing cost-effective and sustainable methods for its removal is essential. This research explores the novel application of raw, unmodified *Dillenia suffruticosa* as a competitive, low-cost plant-based biosorbent for the targeted removal of Cd(II) ions from aqueous systems. The study focuses on optimizing experimental parameters, performing kinetics analysis, and investigating intra-particle diffusion mechanisms. Under optimal conditions, specifically 0.50 g dosage, 300-500 µm particle size, 60 min shaking, 30 min settling, and ambient pH of 7.35, the process achieves a removal efficiency of over 94% with a *qmax* of 573 mg kg^{-1}. Fourier-transform infrared spectroscopy indicates that the biosorbent contains organic functional groups, such as carbonyl, hydroxyl, and carboxyl, which promote the binding of Cd(II) during the adsorption process. In contrast, X-ray fluorescence spectroscopy confirms the transfer of Cd(II) ions onto the biosorbent surface. Kinetics studies performed by varying the initial pH and Cd(II) concentration show that the adsorption process is best fitted to the pseudo-second order model. Linear plots constructed according to the Weber-Morris intra-particle diffusion model do not pass through the origin, indicating that intra-particle diffusion is not the sole rate-limiting step, and instead, the overall adsorption rate would be controlled by both film diffusion and boundary layer effect. Furthermore, it is observed that an increase in the initial Cd(II) concentration and the solution pH enhances adsorption characteristics, leading to higher adsorption capacities (*qt*). These results demonstrate that *Dillenia suffruticosa* dry powder is a highly effective and environmentally friendly alternative for the treatment of water contaminated with Cd(II).

Keywords:

Biosorbent, *Dillenia suffruticosa*, kinetic, pollutants

Abstract No: 2025_388

Computational investigation of the endocrine-disrupting potential of Bisphenol F and its sulfate metabolite targeting the RAR-γ receptor

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Endocrine-disrupting compounds (EDCs) have been known to interfere with hormonal signaling pathways by interacting with significant biological receptors, leading to negative impact on human health. This study evaluates the endocrine-disrupting potential of two selected compounds, the Bisphenol A analog Bisphenol F (BPF) & its metabolite Bisphenol F mono-sulfate sodium salt (BPF-S) through their interaction with the human RAR-γ receptor. The Auto Dock Vina was used to perform molecular docking to predict binding affinities, binding orientations and key interaction profile within the receptor binding site. The results indicated that BPF-S exhibited stronger binding affinity (-9.2 kcal/mol) compared to the parent compound, BPF (-8.4 kcal/mol), forming stable hydrogen bonds and hydrophobic interactions with critical amino acid residues that were linked with the receptor activity. To further validate these findings, molecular dynamic simulations were carried out using GROMACS for 25 ns to assess the stability and dynamic behavior of the ligand-receptor complexes under physiological conditions. Structural stability and conformational behavior of the complexes were analyzed using RMSD, RMSF, Hydrogen bonds and radius of gyration (Rg). The BPF-S-RAR-γ complex had lower values of RMSD and lower fluctuations of the residues, indicating enhanced stability and potential to alter the receptor conformation. In contrast, BPF ligand showed comparatively greater fluctuations and lack of interaction stability. These findings suggest that BPF-S possesses a greater potential to disrupt normal functioning of the receptor RAR-γ and may act as a stronger endocrine-disrupting compound. This study highlights the value of computational approaches in elucidating the molecular mechanisms underlying endocrine disruption as well as the assessment of their possible impact on risk assessment of human health.

Keywords:

endocrine disruption, endocrine-disrupting compounds, molecular docking, molecular dynamic simulation

Acknowledgment:

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Abstract No: 2025_389

Electroanalytical Detection of Diclofenac Using Nano CuO Modified Glassy Carbon Electrode

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Diclofenac (DCF) is an electroactive, nonsteroidal anti-inflammatory drug (NSAID) primarily used to reduce pain and inflammation. DCF is safe to use in normal therapeutic doses (50-150) mg. Overdose of DCF may cause adverse effects in the human body. Accumulation of DCF causes negative effects on the environment and living organisms. Hence, a sustainable method is required for detecting DCF. Electroanalytical methods are highly sensitive for the analysis of drugs. No research has been done to detect DCF by using nano CuO modified glassy carbon electrodes (MGCE). CuO nanoparticles have been used for modification to make the electrode surface active. Green synthesis of nanoparticles is used to synthesize CuO. *Elaeocarpus serratus* (Ceylon Olive) is an indigenous plant in Sri Lanka, which is enriched with biomolecules that act as a reducing agent. The particle size of CuO is in the nano range. Cyclic voltammetry (CV) and amperometry were used for the electroanalytical characterization of DCF. The electrochemical redox behavior of DCF was studied over a potential range of -0.2 V to 1.2 V using pH 7 Britton–Robinson buffer at an optimized scan rate of 50 mV s^{-1}. In the pure DCF sample, two anodic peaks at 0.7 V and 0.4 V and one cathodic peak at 0.3 V can be observed with MGCE, with the enhancement of the current, whereas unmodified GCE only shows one anodic peak at 0.7 V. Nano CuO is a electrocatalyst that acts as a redox mediator to enhance electron transport. The constructed sensor can detect DCF in pure and pharmaceutical formulations with the analytical characteristics of limit of detection, sensitivity, selectivity, and linear dynamic range. This can apply directly to real samples.

Keywords:

CuO nanoparticles; Ceylon Olive leaves; diclofenac; electroanalytical.

Abstract No: 2025_391

Modelling of corrosion of mild steel in strong acidic media through mass loss measurements

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Corrosion has been problematic especially in industrial activities, and hence, various corrosion inhibitory activities have been implemented, most of which are with synthetic chemicals. Mass loss measurements are used as reliable means for overall quantitative estimation of the extent of corrosion. Nevertheless, modelling of corrosion of mild steel, which is important to predict the extent of corrosion in various environments, including industrial setting, has not been elaborated. As such, this study focused on the use of mass loss measurements of rectangular mild steel specimens of dimensions 30.0 mm × 10.0 mm × 2.0 mm to formulate a mathematical model for its corrosion in H_2SO_4 and HCl media within the concentration ranges of 0.10 – 2.00 mol L^{-1} and 0.20 – 4.00 mol L^{-1}, respectively. Negative exponential decay of the mass of mild steel specimens in both media recorded over a period of one week with leveling off at longer exposure times, leads to model the mass (m) as a function of time given by, $m = A + Be^{-kt}$ where t is time of exposure, and k is rate constant of corrosion. The parameters A and B depend on the initial acid concentration, type of acid and the initial mass of the specimen. The extent of corrosion of mild steel is significantly lowered in the presence of Indian almond (*Terminalia catappa)* dry leaf powder as a green corrosion inhibitor, which leads to decreased decay pattern. Hence, the above relationship modeled for mass loss in the absence of the inhibitor can be revised to describe the inhibitory corrosion action. Extension of this model for prediction of corrosion of mild steel in different media and of stainless steel in the absence and presence of inhibitors will be a viable future direction.

Key words:

Corrosion rate; Exponential decay; Green inhibitors; Mild steel

Abstract No: 2025_393

Investigation of the effect of interlayer anion towards corrosion inhibition properties of Zn-Al layered double hydroxides

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Layered double hydroxides (LDHs) are layered materials showing tunable properties based on their composition. The structure provides interlayer spacing which can accommodate chemical species broadening its use for a number of applications. Corrosion is one of the prominent issues where various materials with corrosion inhibitory properties are still being developed for specific applications. Being a 2D material, LDH has potential to make an extended surface barrier and to utilize its interlayer space to trap corrosion inhibitors. In this study, we investigated the corrosion inhibition properties of Zn-Al LDH and its interlayer anion under corrosive conditions. Grade 304 stainless steel was selected as the substrate and aspartic acid which has the ability to exchange with Cl^- ions was used as the intercalated species. The corrosion inhibition properties were investigated using multi-technique approach including mass loss measurements, electrochemical impedance spectroscopy, and Tafel slope analysis. Results shows that the average mass loss of 7.8% under 2M HCl was decreased to 5.4% with Zn-Al LDH coating and it was further decreased to 5.1%, with aspartic acid intercalated LDH coating. The polarization resistance of bare SS Grade 304 which was 2.67 Ω was increased to 3.53 Ω with Zn-Al LDH coating and was further increased to 5.98 Ω with aspartic acid intercalated LDH coating. Together with Tafel polarization analysis, the corrosion inhibition efficiency of intercalated LDH showed 3.48% enhancement and 6.54% reduction of corrosion rate. Overall, the study reveals that the Zn-Al LDH exhibits corrosion inhibition properties by introducing physical barrier between the SS304 and the corrosive medium and the intercalated anion further enhances corrosion resistance through ion-exchange processes and suppression of Cl^- ion penetration.

Key words:

Zn-Al LDH, corrosion inhibition, aspartic acid intercalation, polarization resistance

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Abstract No: 2025_395

Investigation of anti-inflammatory and antibacterial activities of *Mimosa pigra* L. seed extracts

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The growing trend of antibiotic resistance and adverse side effects associated with synthetic drugs has driven global interest toward plant-derived bioactive compounds for drug development. This study evaluates the anti-inflammatory and antibacterial potential of seed extracts of *Mimosa pigra* L., an invasive species common in tropical regions. The seeds were extracted via sequential maceration using three solvent systems: hexane, ethyl acetate, and methanol. Total phenolic content (TPC) and total flavonoid content (TFC) were examined based on the Folin–Ciocalteu and aluminium chloride colorimetric methods, respectively. Anti-inflammatory activity was assessed using the human red blood cell (HRBC) membrane stabilization assay, and antibacterial activity by agar well diffusion against *Staphylococcus aureus* and *Escherichia coli*. The highest phenolic content was observed in the methanolic extract (62 mg GAE/g), whereas the ethyl acetate extract exhibited the highest flavonoid content (223 mg QE/g). The ethyl acetate extract demonstrated the strongest anti-inflammatory activity (IC_{50} = 1471 mg/L), while hexane and methanol extracts showed comparatively lower activity (IC_{50} = 1698 mg/L and 1865 mg/L, respectively). In antibacterial assays, the ethyl acetate extract showed the highest activity, with inhibition zone diameters of 16 mm for *S. aureus* and 13 mm for *E. coli*. The hexane extract showed comparatively lower activity (12 mm for *S. aureus* and 10 mm for *E. coli*), while the methanol extract showed no response against both bacterial strains. The enhanced bioactivity of the ethyl acetate extract may be due to its elevated flavonoid content, a group of abundant phytochemicals in the *Mimosa* genus. These findings demonstrate that *Mimosa pigra* seed extracts possess notable biological activities, and continuing studies may support their potential application in natural drug discovery.

Keywords:

Mimosa pigra, Phytochemicals, Anti-inflammatory, Antibacterial

Abstract No: 2025_396

Plant-mediated synthesis of ZnO nanoparticles from *Dillenia triquetra* leaf extract and investigation of photocatalytic efficiency

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Zinc Oxide (ZnO) nanoparticles (NPs) are widely utilized semiconductor photocatalysts due to its eco-friendly nature and cost effectiveness in degrading environmental pollutants. In this study, plant extract-based synthesis of ZnO NPs was achieved using *Dillenia triquetra* leaf extract, where natural phytochemicals acted as reducing and capping agents. The leaves of *D. triquetra* collected were powdered and subjected to extraction with deionized water. The synthesis parameters including pH, precursor concentration, and extract to precursor ratio were optimized to obtain nanoparticles with desirable properties. The physical properties of the synthesized ZnO nanoparticles (NPs) were analyzed using UV-visible spectroscopy, Fourier transform Infrared spectroscopy (FTIR), X-ray diffraction (XRD) and scanning electron microscope (SEM) analysis. UV-visible analysis showed characteristic absorption peak for ZnO NPs at 356 nm while the FT-IR spectra confirmed the presence of functional groups in the synthesized ZnO nanoparticles. XRD patterns confirmed the crystalline nature of the synthesized NPs and SEM analysis indicated mostly spherical nanoparticles with an average size of 10.53 ± 0.47 nm. The photocatalytic activity of ZnO NPs was investigated against Methylene Blue (MB) organic dye and it was optimized with respect to MB dye concentration, pH of the solution, and the catalytic load. The optimum conditions were identified as pH 11, 5 ppm MB concentration, and 5 mg catalytic load. Under optimum experimental conditions, the synthesized ZnO nanoparticles achieved up to 95% degradation of MB over 2 hours, demonstrating their strong potential as an effective photocatalyst for reducing water pollution. Further investigations will be conducted to evaluate the performance of ZnO NPs with other organic dyes and polluted samples in addition to MB.

Keywords:

Zinc oxide, green synthesis, *Dillenia triquetra* leaf extract, photocatalytic activity

Abstract No: 2025_397

Green synthesis of zinc oxide nanoparticles using *Pandanus ceylanicus* leaf extract and investigation of their antibacterial activity

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Zinc oxide nanoparticles (ZnO NPs) are well known for their unique optical, photocatalytic, antibacterial and other properties due to their nanoscale size, high surface area and wide band gap, making them valuable in environmental and biomedical applications. This study reports the green synthesis of ZnO NPs using aqueous leaf extract of *Pandanus ceylanicus* as a natural reducing and stabilizing agent. This approach offers an eco-friendly alternative to conventional chemical and physical routes, minimizing the use of hazardous reagents and environmental impact. The NPs were synthesized using zinc nitrate as the precursor at a 0.2 mol dm-3 concentration, with a plant extract to precursor ratio of 1:1, at pH 12 and a temperature of 50 ºC. They were then characterized using UV-Visible spectroscopy, Fourier Transform Infrared spectroscopy (FTIR), X-ray Diffraction (XRD) and Scanning Electron Microscopy (SEM) to examine their optical properties, crystal structure, and surface morphology. The UV-Visible spectrum exhibited a distinctive peak at 359 nm confirming their formation and further characterization was performed. These green synthesized ZnO NPs have upsurge in applications across various sectors, including antibacterial activity which has gained a considerable attention, making them promising candidates for combating antibiotic resistant bacteria. Accordingly antibacterial activity was investigated against *Staphylococcus aureus* (Gram-positive, ATCC 25923) and *Escherichia coli* (Gram-negative, ATCC 25922). Results indicated that the inhibitory effect of the NPs increased proportionally to the NP concentration. It exhibited higher antibacterial activity against *S. aureus* with a minimum inhibitory concentration of 7000 µg/mL, compared to *E. coli*, which showed inhibition only at 40,000 µg/mL. This observed higher antibacterial activity of NPs against Gram-positive bacteria compared to Gram-negative bacteria is attributed to differences in their cell wall structure and interactions with the NPs, which is consistent with previously reported studies. Further studies on the antibacterial activity of these green synthesized ZnO NPs are underway, focusing on their underlying mechanisms and potential biomedical applications.

Keywords:

Pandanus ceylanicus; ZnO nanoparticles; Green synthesis; Antibacterial activity.

Abstract No: 2025_398

Biosorption behavior of copper onto curry leaves (*Murraya koenigii*): isotherm, kinetic and thermodynamic perspectives

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Industrial activities have increased heavy metal contamination in water, creating significant environmental and health concerns. This study investigates the potential of curry leaves (*Murraya koenigii*), widely used in Sri Lankan cuisine as a flavoring ingredient, as a sustainable biosorbent for copper (Cu) remediation. Curry leaves were washed with deionized water, dried, and ground to a particle size less than 1 mm. Isotherm, kinetic, and thermodynamic studies were conducted to understand adsorption mechanisms. Fourier Transform Infrared Spectroscopy revealed the presence of carboxyl, hydroxyl, and amine groups on the biosorbent surface, suggesting that Cu adsorption may occur via surface complexation and ion-exchange interactions. Optimum adsorption conditions (84.9% ± 0.7%) were observed at an initial Cu concentration of 0.6 ppm, an adsorbent dosage of 0.04 g, pH 6, a temperature of 40 °C, and a contact time of 80 min. The moderate adsorption efficiency observed under optimized conditions may be due to the limited availability of active binding sites and the untreated nature of the biomass. Langmuir isotherm gave the best fit ($R^2 > 0.89$), indicating monolayer adsorption on a homogenous surface with an adsorption capacity of 0.3398 mg g^{-1}. Kinetic data followed the pseudo-second-order model ($R^2 = 0.90$), suggesting chemisorption as the dominant mechanism. Thermodynamic parameters were revealing an exothermic process ($\Delta H = -10.15$ kJ mol^{-1}), suggesting a mechanism closer to physisorption with decreased randomness at the solid–solution interface ($\Delta S = -28.27$ J mol^{-1} K^{-1}). A positive Gibbs free energy value ($\Delta G = 1.727$ kJ mol^{-1}) at 298 K showed that adsorption was non-spontaneous under the studied conditions. Overall, although the adsorption capacity was comparatively lower than that of modified biosorbents reported in literature, curry leaves have the potential to remove Cu ions from aqueous medium. Further studies are recommended to enhance adsorption efficiency under realistic environmental and food-related conditions.

Keywords:

Curry leaves, Adsorption, Biosorbent, Isotherm, Kinetic

Abstract No: 2025_400

Optimization of experimental parameters and thermodynamics analysis for biosorption of Cd(II) from aqueous solutions using raw biomass and biochar of *Panicum maximum* leaves

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Water contamination from heavy metals has become a major environmental concern. Cadmium which exists as Cd(II) can be considered to be a toxic heavy metal that causes severe effects. As a remedial measure, adsorption has been introduced as an efficient treatment technique for heavy metal removal. The focus of this study is to identify the capability of raw biomass (RP) and biochar (BP) derived from *Panicum maximum* leaves to remove Cd(II) ions from aqueous solution through the optimization of parameters and extending toward the evaluation of thermodynamic parameters associated with the adsorption process. Optimization of biosorbent dosage, shaking time, settling time and pH, performed by through batch experiments using 50.0 mL of 10 ppm Cd(II) solutions varying one parameter at a time while keeping all the others unchanged, leads to the values of 0.500 g, 40 min, 40 min and ambient pH, respectively, for both RP and BP. Adsorption characteristics of Cd(II) investigated for RP at ambient temperature and 305 K, and for BP at ambient temperature and 335 K clearly indicate that the equilibrium constant of adsorption increases; consequently, the negative value of the standard free energy change increases when the temperature is increased, confirming the improvement in the spontaneity of the process. Moreover, the standard enthalpy change and the standard entropy change are positive, indicating endothermic behavior of adsorption, suggesting that warmer temperatures would be preferable for large-scale removal of Cd(II) from contaminated water.

Keywords:

Biosorption, cadmium, optimization, thermodynamics

Abstract No: 2025_401

Biosorption of Cu (II) using dried *Garcinia quaesita* rinds: equilibrium, kinetic, and thermodynamic investigations

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Dried fruit rinds of *Garcinia quaesita* (Goraka) are a prevalent food additive found in the Asian food context. This study includes a preliminary study of investigating the Copper (Cu^{2+}) adsorption potential of dried fruit rinds of *G. quaesita*. Goraka rinds collected were cleaned with deionized water, air-dried in shade, powdered, and screened to a particle size less than 2 mm. To optimize different influencing parameters, such as initial Cu^{2+} concentration, adsorbent dosage, contact time, pH, and temperature, adsorption experiments were carried out *via* batch method. A maximum Cu^{2+} adsorption of (74.0 ±0.7 %) was obtained under the optimum conditions: 0.06 g adsorbent dosage, initial Cu^{2+} concentration of 0.8 ppm (25.0 mL), pH of 6, 80 minutes of contact time, and 40˚C as the optimum temperature. The equilibrium and kinetic studies were best fitted with Langmuir isotherm (R^2 =0.9617) and pseudo-second order-kinetics (R^2 = 0.9406), implying a homogeneous surface forming a monolayer, with chemical reaction between adsorbate: metal ion and active sites: -OH and -C=O groups identified from Fourier Transform Infrared Spectroscopy being the rate controlling step. According to the thermodynamic data, the negative enthalpy value (ΔH = -24.36 kJ mol^{-1}) suggests an exothermic adsorption process that is energetically favorable at lower temperatures. Furthermore, the entropy value (ΔS = -81.38 J mol^{-1} K^{-1}) reflects the metal ion immobilization and increased ordering at the surface upon adsorption. A small positive Gibbs free energy value (ΔG = 0.3 kJ mol^{-1}) indicates that the adsorption process occurs near equilibrium, with a minor energy barrier. The adsorption capacity of *G. quaesita* (0.2 mg g^{-1}) highlights its potential for trace-level Cu^{2+} removal. While *G. quaesita* shows potential for trace-level Cu^{2+} removal, its practical application may be limited to pre-cooking or low-temperature conditions, suggesting the importance of further evaluation under actual cooking environments.

Keywords:

Garcinia quaesita; Curry leaves; Copper removal; Biosorbent.

Abstract No: 2025_402

Advancing sustainable corrosion control: elucidating the protective mechanism of chitosan-pectin biopolymers against acidic corrosion of stainless-steel Grade 202

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Stainless steel (SS) Grade 202 possesses strong corrosion resistance characteristics in mild acidic conditions owing to the formation of a passive chromium oxide film. However, the stability of the material in more aggressive acidic conditions requires further understanding. The present study thus aims at the investigation of the corrosion behavior of SS Grade 202 in different HCl solutions, and corrosion inhibitory characteristics of eco-friendly biopolymers, namely, chitosan and pectin toward SS Grade 202. Chitosan and pectin, having electronegative functional groups such as O–H/N–H, carbonyl and C-O groups with band positions at 3200 − 3400 cm^{-1}, 1739 cm^{-1} and 1217 cm^{-1}, respectively, enhance the corrosion resistance, as determined through mass loss measurements, electrochemical impedance spectroscopy (EIS) and Tafel slope determinations. Mass loss measurements depict that SS Grade 202 in the presence of chitosan in the corrosive medium of HCl at 1% strength shows an absolute mass loss of 18-19% compared to the uninhibited system having mass loss of 22-27%. Chitosan at 3% strength results in even a lower mass loss of 17-18%. On the other hand, pectin (1%) shows lower mass losses ranging from 10-11%, to 9-10% in 3% pectin. Thus, pectin of 3% strength exhibits the highest level of effectiveness in protecting SS Grade 202 from corrosion. Increase in charge transfer resistance to 12-35 Ω cm^{-2} in the presence of 3% pectin, which is 5-8 times higher than that for the blank system, and the reduction of current density to ~10^{-5} A cm^{-2} by 90% in the same inhibitory system. The results of the techniques used prove the effectiveness of inhibitors in the decreasing order of 3% pectin > 1% pectin > 3% chitosan > 1% chitosan. Practical application of these findings would require further research to design effective coatings incorporating the inhibitor and suitable polymeric material.

Keywords:

Corrosion rate, chitosan, inhibition, pectin

Abstract No: 2025_403

Spatial and Temporal Variation of Atmospheric Quality through Analysis of Rainwater: A Comparative Study of Kandy, Peradeniya, and Horana, Sri Lanka

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Water molecules present in the atmosphere, when condensed under gravitational force, result in wet precipitation, while the transfer of particles in the absence of rain events is dry precipitation. During the earlier process, raindrops capture various pollutants that circulate in the atmosphere and transfer them to the ground and water bodies. The quality of both wet and dry precipitations thus affects environmental quality, and hence it is important to regularly monitor the quality of the precipitation, although this exercise has not been given due attention. In this context, this study emphasizes the monitoring of the quality of precipitation at three sampling sites: Kandy Zonal Education Department (KEZ), University of Peradeniya (UOP), and Kulupana-Horana area (KUH), representing semiurban and urban areas. These three sites show 85%, 85%, and 90% wet precipitation, and an average rainfall of 31.82 mm, 32.95 mm, and 64.25 mm, respectively, during the sampling period from 13th of April 2025 to 18th January 2026. Average pH values of 6.40, 6.81 and 6.41, and average total hardness values of 19.40 mg L^{-1}, 13.71 mg L^{-1} and 13.53 mg L^{-1} were determined for the KEZ, UOP and KUH sites, respectively. The average electrical conductivities were 32.31 µS cm^{-1}, 30.73 µS cm^{-1} and 20.34 µS cm^{-1}, average TDS values were 22.73 mg L^{-1}, 21.59 mg L^{-1} and 14.20 mg L^{-1}, and the average salinity levels were 0.018 µg L^{-1}, 0.016 µg L^{-1} and 0.012 µg L^{-1} for the same three sites, respectively. The KEZ site, being in an urban area, shows higher ionic content due to vehicular and other emissions, and further, the total hardness is also high due to particulate matter discarded from construction sites and other activities. The study should be continued to determine the anionic, cationic, and trace metal contents, to elaborate on mitigative measures to minimize harmful emissions.

Keywords:

Horana, Kandy, physicochemical parameters, rainwater, University of Peradeniya (UOP)

Abstract No: 2025_405

Comparative classification of Sri Lankan tea from seven regions using pH, total polyphenolic content, and dry matter content as analytical parameters

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Black tea infusions prepared from BOPF grade samples representing the seven major Sri Lankan tea-growing regions, Nuwara Eliya, Uda Pussellawa, Dimbula, Uva, Kandy, Sabaragamuwa, and Ruhuna, were evaluated using pH, total polyphenolic content (TPC), and dry matter content (DW) as classification parameters. The results demonstrated distinct regional variation across all measured properties. TPC ranged from 16.38 ± 1.36 %DW to 24.58 ± 2.23 %DW, with the highest value observed in Ruhuna and the lowest in Uva, while Nuwara Eliya also exhibited relatively high TPC compared to other regions. Dry matter content showed a narrower range between 90.55 ± 0.73 % and 94.25 ± 1.03 %, with Uva and Sabaragamuwa recording the highest values, whereas Dimbula showed the lowest. The pH values ranged between 4.89 ± 0.10 and 5.28 ± 0.18, confirming the mildly acidic nature of all infusions, with Sabaragamuwa having the highest pH and Uva the lowest. Regional variations suggested possible relationships between polyphenolic content, acidity, and liquor characteristics. Statistical analysis using one-way ANOVA confirmed significant differences among the regions for TPC ($F = 12.109$, $p < 0.001$), dry matter content ($F = 20.61$, $p < 0.001$), and pH ($F = 66.16$, $p < 0.001$), demonstrating the strong influence of geographical origin on tea composition. The combined evaluation of these parameters enabled effective differentiation of regional characteristics, although some overlap was observed among mid-grown regions. These findings highlight the suitability of pH, TPC, and dry matter as simple analytical indicators for classification and their potential application in developing rapid identification and authentication systems for Sri Lankan black tea.

Keywords:

Sri Lankan tea; seven regions; pH; dry matter content; total polyphenolic content

Acknowledgment:

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Abstract No: 2025_408

Synthesis of novel 2,3-dihydroquinazolin-4(1*H*)-one derivatives and determining their antimicrobial activity via *in-silico* and *in-vitro* study

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The rising antibiotic resistance highlights the crucial need for novel therapeutic agents with improved efficacy. In this study, five novel 6-bromo-2-aryl-2,3-dihydroquinazolin-4(1*H*)-one derivatives bearing various para-substituted phenyl groups, including hydroxy(-OH), nitro (-NO_2), chloro (-Cl) and methoxy (-OCH3) were synthesized *via* acid-catalyzed cyclocondensation of 2-amino-5-bromobenzamide with corresponding aldehydes, resulting in moderate to good yields (23-66%). The structures of the compounds were confirmed by FT-IR, ^{1}H-NMR, ^{13}C NMR, and HRMS data. Antimicrobial activity of the compounds was evaluated using the standard Agar Well Diffusion assay against *Escherichia coli, Proteus mirabilis, Staphylococcus aureus, Staphylococcus epidermidis,* and *Aspergillus niger*. Among the synthesized compounds, the para-hydroxyphenyl substituted derivative exhibited selective antibacterial activity against *S. aureus* across 10.00 and 5.00 mg mL^{-1} with inhibition zones ranging from 1.2 ± 0.2 to 2.0 ± 0.2 cm, whereas the para-nitrophenyl substituted derivative showed antifungal activity against *A. niger* across 20.00, 10.00, and 5.00 mg mL^{-1} with inhibition zones ranging from 2.4 ± 0.0 and 2.9 ± 0.1 cm. The *in silico* molecular docking study targeting proteins, *E. coli* DNA Gyrase and *S. aureus* Sortase A, indicated strong binding affinities (≤ -7.0 kcal/mol) for all synthesized compounds, while the para-nitrophenyl substituted derivative exhibiting binding affinities exceeding -8.0 kcal/mol. All ligands formed stable hydrogen bonds and π–π interactions within the active site and other binding sites, predicting docking efficiencies greater than that of the standard gentamicin and fluconazole drugs. Despite the limited *in vitro* activity observed, which can be attributed to inadequate water solubility and restricted diffusion, combined experimental and computational results emphasize the dihydroquinazolinone scaffold as a promising lead for antimicrobial drug discovery, highlighting the influence of electron-donating and electron-withdrawing substituents on antimicrobial selectivity.

Keywords:

Dihydroquinazolinone, synthesis, antimicrobial activity, in-silico

Abstract No: 2025_413

Analysis of beta carotene content in a value-added pumpkin (*Cucurbita spp.*) and curry leaves (*Murraya koenigii*) instant soup mixture

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Pumpkin *(Cucurbita maxima)* is a widely cultivated vegetable in Sri Lanka and is recognized for its high β-carotene content and nutritional value. To reduce post-harvest losses, a dehydrated instant soup mix (ISM) based on *C. maxima* was developed. The β-carotene content of three sample types, an aged soup formulation, a freshly prepared soup formulation, and *C. maxima* flour produced by dehydration, was analyzed. The β-carotene determination was performed using an Agilent High-Performance Liquid Chromatography (HPLC) system equipped with a reverse-phase column and a UV–visible photodiode array detector. The mobile phase consisted of acetonitrile, methanol, and ethyl acetate supplemented with 0.05% triethylamine. Identification of β-carotene was achieved by comparing retention times and absorption maxima (λmax). The results indicated that pumpkin flour exhibited the highest β-carotene concentration (5.37 ± 0.25 ppm), demonstrating its potential as a rich source of provitamin A. In comparison, the fresh ISM Sample B contained 3.89 ± 0.26 ppm of β-carotene. After one year of storage, the β-carotene content of ISM Sample B decreased to 3.55 ± 0.28 ppm. This represents a reduction of approximately 8.7%, suggesting that β-carotene is susceptible to degradation over time. The observed decline may be attributed to environmental factors such as light exposure, oxygen, and temperature fluctuations during storage. This study suggests that the product retains a substantial proportion of its nutritional value even after extended storage.

Keywords:

Beta carotene; Soup formula; *Cucurbita maxima.*

Acknowledgement:

We thank Ms. P R Kumari for the assistance provided during the study.

Abstract No: 2025_414

Corrosion inhibition of iron in saline medium by schiff base derived Co(II) and Zn(II) complexes as self-assembled protective layers

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Iron corrodes through electrochemical reactions with oxygen and moisture, forming rust (hydrated ferric oxide), so protective coatings are essential to maintain the structural integrity. This study reports an experimental assessment of newly synthesized Schiff base metal complexes of Co(II) and Zn(II) as corrosion inhibitors for iron in saline medium. The metal ions were selected due to their distinct *d*-orbital configurations (Co^{2+}; d^7 and Zn^{2+}; d^{10}), influencing ligand-to-metal charge transfer (LMCT) and adsorption behavior, as well as non-toxicity. Structural characterization was performed using FTIR and UV-visible and NMR spectroscopy. The free ligand shows characteristic C=N stretch at 1612 cm^{-1} indicated imine functional group, which shifted to 1603 cm^{-1} (Co-complex) and 1602 cm^{-1} (Zn-complex) upon complexation. Furthermore, analysis of UV spectra revealed that coordination with Zn(II) and Co(II) ions led to slight bathochromic shifts in the absorption maxima to 233 nm and 235 nm, indicating LMCT or *d–d* electronic transitions. Elemental (CHN) analysis further verified the Co(II) and Zn(II) complexes. Surface wettability studies using contact angle measurements revealed the development of self-assembled protective layers on the iron surface, indicating effective adsorption of the complexes. The Zn(II) complex achieved the highest contact angle of 77°, indicating the highest hydrophobicity compared to the Co(II) complex and bare substrate. Corrosion inhibition was evaluated using ferroxyl test, SEM, weight-loss, and EIS techniques. Ferroxyl test confirmed silane-coated areas resist corrosion better than uncoated regions. According to the impedance results, Co(II) and Zn(II) coatings show higher charge transfer resistance than ligand-only and bare substrate in 3.5% NaCl solution. The results showed that the Co(II) and Zn(II) complexes provide enhanced corrosion protection compared to the ligand alone and uncoated iron. Overall, the results confirm that the both metal complexes, particularly Zn(II), effectively achieve the objective of enhancing corrosion protection for iron in saline media.

Keywords:

Corrosion, Corrosion inhibitors, Iron corrosion, Schiff base metal complexes

Acknowledgement:

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Abstract No: 2025_417

Computational study of ginkgolide B and P2X7 receptor interactions in neuroinflammatory pathways

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Neurodegenerative diseases represent an increasing global health burden and are characterized by progressive physical and cognitive decline. A central contributor to their pathogenesis is neuroinflammation, mediated by activated microglia. Upon stimulation, microglia release pro-inflammatory mediators, including IL-1β, TNF-α, iNOS, and COX-2, contributing to neuronal dysfunction and cell death. The P2X7 receptor plays a pivotal role in regulating this inflammatory cascade and has emerged as a promising therapeutic target. However, the molecular interactions between Ginkgolide B and the P2X7 receptor remain poorly understood. Therefore, this study aimed to investigate the binding mechanism of Ginkgolide B towards the P2X7 receptor using computational approaches. The three-dimensional structure of the P2X7 receptor was generated using SWISS-MODEL and analyzed using binding site prediction tools, including COACH-D, Prank Web, and Protein Plus, to identify functionally relevant residues. A membrane bound receptor system was constructed using CHARMM-GUI, followed by a 200 ns molecular dynamics simulation using NAMD to assess structural stability of the wild-type receptor. Ginkgolide B was optimized using density functional theory at the B3LYP/6-31G(d) level and parameterized through CHARMM-GUI. The optimized ligand was subjected to blind molecular docking using PyRx to identify potential binding regions within the receptor. Docking results revealed binding energies ranging from −7.5 to −7.9 kcal/mol, indicating favorable ligand receptor interactions. Targeted docking within the most favorable binding pocket further refined ligand positioning and interaction profiles. The best-binding pose exhibited hydrogen bond interactions with ASN100 and SER59, together with van der Waals interactions involving ILE58 and VAL321. These residues are located within functionally relevant receptor regions contribute to ligand stabilization. The interaction pattern suggests that Ginkgolide B associate with regions of the P2X7 receptor involved in receptor function and modulation. Overall, this study provides computational evidence supporting Ginkgolide B as a potential lead compound for further investigation targeting P2X7 receptor-mediated neuroinflammation in neurodegenerative disorders.

Keywords:

Neuroinflammation, P2X7 receptor, Ginkgolide B, molecular docking, molecular dynamics.

Acknowledgement:

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Abstract No: 2025_418

Bioaccumulation of heavy metals/metalloids and associated health risk assessment in *Scylla serrata* and *Penaeus* spp. from the Negombo estuary, Sri Lanka

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The Negombo estuary is an economic hub for shrimp and crab fisheries, serving as an important source of protein. However, its proximity to industrial zones has led to heavy metal/metalloid contamination that poses toxicity risks to consumers. This study quantified selected toxic elements in popular crustacean species and assessed consumer health risks. Samples of two commercially important crustacean species, *Scylla Serrata* (mud crab) (n= 12, average weight= 198.20 g) and *Penaeus* spp (shrimp) (n= 12) were collected from approximately 2 km distance from the Kirillagahawatta region. Shrimp were categorized as juvenile (average weight = 0.70 g) and sub-adult (average weight=2.30 g) based on size. Concentrations of Pb, Cd, Cr, and As were determined using Inductively Coupled Plasma-Mass Spectrometry, following microwave digestion. The Target Hazard Quotient (THQ) was evaluated to determine the non-carcinogenic health risk. *Scylla serrata* species had the highest concentrations of toxic elements (Cr=1.73 ± 0.00 mg/kg, As=1.08 ± 0.42 mg/kg, Cd=1.45 ± 0.82 mg/kg, Pb =2.10 ± 0.87 mg/kg) with its hepatopancreas being the most contaminated tissue. Across all samples, total ranges and means (mg/kg) were Cr=1.38 -1.88 (mean=1.648 ±0.170); As=0.29-1.08 (mean= 0.652 ±0.225); Cd= 0.01-1.45 (mean= 0.316 ±0.367); Pb=0.64-2.10 (mean=1.31 ±0.85). Concentration of heavy metals/metalloids increased from juvenile to sub-adult stages of *Penaeus* spp. The highest THQ is observed for As (11.95 ± 4.72) in *Scylla serrata* hepatopancreas, which is about 12 times higher than the threshold. Carcinogenic risk for *Scylla serrata* hepatopancreas was acceptable for Pb (5.0×10^{-5}) but exceeded thresholds for Cr (2.90×10^{-3}) and As (0.5×10^{-3}). Notably, Cd levels in the *Scylla serrata* hepatopancreas posed an even greater concern (2.94×10^{-2}). Thus, chronic exposure imposes significant carcinogenic and non-carcinogenic risks such as renal and endocrine dysfunction. Environmental regulation is essential for ensuring ecosystem conservation and consumer safety.

Keywords:

Health-risk assessment, Negombo estuary, *Scylla serrata*, *Penaeus* spp

Abstract No: 2025_422

Molecular docking and dynamics of carnosic acid-ALDH1A1 to overcome chemoresistance in ovarian cancer

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Ovarian cancer remains the most lethal gynecological malignancy, primarily due to the development of chemoresistance following platinum-based therapy. Overexpression of aldehyde dehydrogenase 1 A1 (ALDH1A1) is strongly associated with cancer stem cell maintenance, therapeutic resistance, and poor clinical outcomes, making ALDH1A1 an attractive therapeutic target. In this study, an integrated molecular docking and molecular dynamics (MD) simulation approach was employed to investigate the inhibitory potential of carnosic acid (CA) against ALDH1A1. Homology modelling generated a structurally complete three-dimensional model of ALDH1A1, and binding site prediction identified a functionally relevant catalytic cavity. Geometry optimization of CA at the B3LYP/6-311G++(d,p) level yielded a stable minimum-energy conformation suitable for docking analysis. Molecular docking performed using PyRx revealed a binding affinity of −7.3 kcal/mol. CA formed interactions with several key active-site residues, including Phe-466, Gly-475, Asn-474, Gly-468, Gly-473, and Leu-428, indicating favorable ligand–receptor engagement within the catalytic region. To further evaluate the stability of the docked complex under physiological conditions, a 100 ns molecular dynamics simulation was performed. RMSD analysis demonstrated that the ALDH1A1–CA complex achieved conformational stabilization after approximately 30 ns and maintained stable interactions throughout the remainder of the simulation, supporting the durability and reliability of the binding mode predicted by docking. Toxicological profiling using ADMETLab 2.0 further indicated a favorable ADMET profile for CA. The observed binding interactions with catalytically significant residues, combined with sustained dynamic stability during MD simulation, suggest that CA may interfere with ALDH1A1 enzymatic activity and potentially disrupt mechanisms associated with cancer stem cell preservation and chemoresistance. These findings provide a computational basis for considering carnosic acid as a potential ALDH1A1-targeting lead compound for ovarian cancer therapy. Further in vitro and in vivo experimental validation is warranted to confirm its biological efficacy and therapeutic potential.

Keywords:

ALDH1A1, Carnosic acid, ovarian cancer, molecular docking, molecular dynamics

Acknowledgement:

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Abstract No: 2025_424

Synthesis and characterization of cinnamon bark oil – encapsulated alginate microcapsules

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The encapsulation of essential oils derived from plants has gained significant attention in the food industry due to their instability and sensitivity to environmental factors such as heat, light, and oxygen. Cinnamon bark oil (CBO) is mainly composed of cinnamaldehyde, which offers potent antimicrobial and antioxidant properties, but cannot be utilized directly on food because of its volatility, degradation, and interference with the physical integrity of the food material. This study focuses on the synthesis and characterization of alginate-based microcapsules incorporating CBO. Microcapsules were synthesized using the ionotropic gelation method with sodium alginate as the encapsulating polymer. The formation of microcapsules was achieved through cross-linking with calcium ions, resulting in stable gel structures. The prepared alginate-cinnamon bark oil microcapsules (AL-CBO-MCs) were characterized using Fourier Transformed Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), and Thermogravimetric Analysis (TGA). AL-CBO-MCs were spherical in shape with an average particle size of around 1.9 μm. The encapsulation efficiency (EE) was determined to be 94±1% with 0.5 g CBO, 0.3% (w/v) alginate (100 ml), and 0.05% $CaCl_2$. The loading capacity (LC) was 30±2%. FTIR analysis showed characteristic peaks corresponding to both alginate and CBO, confirming successful encapsulation of CBO inside the alginate matrix. TGA confirms the protective effect of the alginate matrix in reducing volatilization and enhancing thermal stability compared to free oil upon encapsulation. Overall, the synthesized AL-CBO-MCs exhibited good structural integrity and reproducibility under selected preparation conditions. In conclusion, alginate-based encapsulation provides a simple, efficient, and reproducible method for the incorporation of CBO into stable microcapsule systems. This study provides a strong foundation for further exploration of alginate -based CBO microcapsule systems in functional applications.

Keywords:

Alginate, CBO, Encapsulation, Ionotropic gelation, Stability.

Abstract No: 2025_425

In silico modelling of thymoquinone disruption of PCSK9-LDLR binding for cholesterol regulation

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Cardiovascular disease remains a leading cause of global mortality, with hypercholesterolemia identified as a major modifiable risk factor. Proprotein convertase subtilisin/kexin type 9 (PCSK9) regulates cholesterol by binding to the EGF-A domain of the low-density lipoprotein receptor (LDLR), promoting its degradation and thereby reducing LDL-cholesterol clearance. Although current PCSK9 inhibitors and statins are effective, their high cost, requirement for injections, and associated side effects limit widespread use. Thymoquinone (TQ), the principal bioactive compound of *Nigella sativa,* exhibits antioxidant, anti-inflammatory, and lipid-lowering properties, making it a potential low-cost therapeutic alternative. However, its molecular interactions with PCSK9, LDLR, and their binding interface remain unclear. In this study, PCSK9 was selected as the primary target, along with LDLR and the PCSK9-LDLR complex. Protein structures were retrieved from the Protein Data Bank and refined using SWISS-MODEL where necessary. Binding site prediction was performed using PrankWeb, ProteinPlus, and COACH-D, and key interface residues were identified through computational prediction and literature validation. A solvated molecular system of PCSK9 was constructed using CHARMM-GUI and subjected to molecular dynamics (MD) simulation using NAMD, indicating receptor stability. Thymoquinone was constructed and geometry-optimized using density functional theory at the B3LYP/6-31G(d,p) level with GaussView and Gaussian, and subsequently assigned CHARMM parameters using CHARMM-GUI for docking studies. Blind molecular docking was performed using PyRx, and ligand-receptor interactions were analyzed using Discovery Studio Visualizer. Docking analysis revealed binding affinities of -5.1 kcal/mol for the PCSK9-TQ complex, -6.3 kcal/mol for the LDLR-TQ complex, and -6.4 kcal/mol for the PCSK9-LDLR-TQ complex. Targeted docking against the identified interface residues, followed by MD simulation of the most stable complex, is expected to reveal interactions that disrupt PCSK9-LDLR binding, supporting TQ as a promising natural, affordable candidate for cholesterol-lowering therapeutic development.

Keywords:

Thymoquinone; PCSK9; LDLR; molecular docking; molecular dynamics

Acknowledgement:

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Abstract No: 2025_426

Computational docking and molecular dynamics study of andrographolide binding to aquaporin-4 to explore neurological edema modulation

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Neurological edema is a life-threatening condition characterized by excessive fluid accumulation within neural tissues, commonly associated with traumatic brain injury, stroke, brain tumors and other central nervous system insults. Current therapeutic approaches largely focus on symptomatic management rather than directly targeting molecular regulators of water transport. Aquaporin-4(AQP4), the predominant water channel expressed in astrocytic endfeet, plays a central role in maintaining cerebral water homeostasis and represents a promising therapeutic target. Andrographolide, a bioactive diterpenoid derived from *Andrographis paniculata*, has demonstrated notable neuroprotective properties, suggesting potential relevance in edema modulation. In this study, an in silico approach combining molecular docking and molecular dynamics (MD) simulations was employed to investigate the interactions of andrographolide with human AQP4. Potential ligand-binding regions were identified using a consensus strategy involving PrankWeb, ProteinPlus and COACH-D and further validated against reported functional residues. The receptor was embedded in a lipid bilayer using CHARMM-GUI and subjected to a molecular dynamics simulation with NAMD for 50 ns to obtain a stable conformation representing its relaxed physiological state. Andrographolide was geometry optimized using density functional theory at the RB3LYP/6-31G(d',p') level and parameterized using the CHARMM General Force Field. Molecular docking was subsequently performed using PyRx, focusing on the extracellular pore entrance of AQP4. Docking analysis yielded binding affinities ranging from -6.1 to -5.5 kcal/mol, indicating moderate but favorable ligand-receptor interactions. Key interacting residues included Arg216, Gly209, Asp69, Trp59, Thr56, Ile73, His151, and Ile205, which are associated with channel function. A 100 ns molecular dynamics simulation confirmed the stability of the AQP4-andrographolide complex, with sustained favorable interactions under dynamic physiological conditions. These results establish a computational framework for evaluating andrographolide as a therapeutic agent in neurological edema, warranting further comparative analysis and experimental validation.

Keywords:

Aquaporin-4; andrographolide; cerebral edema; molecular docking; molecular dynamics.

Acknowledgement:

The author extends sincere gratitude to Mr. U. A. A. Rodrigo for his dedicated mentorship throughout this study and gratefully acknowledges the facilities and support provided by the College of Chemical Sciences, Institute of Chemistry Ceylon.

Abstract No: 2025_427

Toxic heavy metal/metalloid contamination and health risk assessment in *Etroplus* spp.; A study in Negombo Estuary, Sri Lanka

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Fish is a rich source of protein, fat-soluble vitamins, and essential minerals that are important for human health. However, fish can also accumulate toxic metals from their environment, which may pose potential health risks to consumers. This study investigates toxic heavy metal/metalloid bioaccumulation and associated human health risks in *Etroplus suratensis* (Koraliya) in the Negombo Estuary, a region impacted by fishing activities and rapid industrialization, providing the first Inductively Coupled Plasma Mass Spectrometry (ICP-MS) based update of heavy metal data in over two decades. Adult specimens of *E. suratensis* (n=18) were collected directly from the fishermen, with an average weight of 208.39 g and average length of 20.3 cm. The samples were analyzed for Pb, Cd, Cr, and As in muscle, gill, and gut tissues via ICP-MS after microwave-assisted acid digestion. Bioaccumulation levels varied significantly by tissue type in the order of gut > gill > muscle. One-way ANOVA revealed that only arsenic accumulation lacked uniformity across tissues, with significant variation specifically in the gut tissue ($p < 0.05$). Chromium levels were elevated across all analyzed tissues, with average muscle concentrations (2.29±0.22 mg/kg) exceeding the permissible limits established by WHO/FAO. Arsenic concentrations were highest in the gut, reaching 1.03 ±0.68 mg/kg. The Target Hazard Quotient (THQ) for Cr (2.54) and As (2.17) both exceeded the safety threshold of 1. Total THQ of 5.45 suggests fish consumption poses health risks, exceeding daily safety intake levels by more than fivefold. Furthermore, the total carcinogenic risk was 5.30×10^{-3}, significantly surpassing the US EPA's maximum threshold of 1×10^{-4}, primarily driven by Cr and As levels in muscle tissue. These findings suggest that long-term consumption of *E. suratensis* from this environment poses substantial health risks. Immediate biomonitoring and stricter industrial waste regulation are essential to minimize heavy metal entry into the food chain.

Keywords:

Etroplus suratensis, Health risk assessment, Negombo estuary, Toxic elements

Abstract No: 2025_429

Evaluation of Pre-Oxidation Strategies for Surface Water Treatment: A Case Study of Dry Aru, Kilinochchi District, Sri Lanka

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This study assesses the comparative evaluation of ozone and chlorine treatment for improving the physicochemical and microbiological quality of surface water from Dry Aru , Sri Lanka. Bench-scale experiments were conducted with chlorine (0.1–4.0 mg/L) and ozone (0.1–0.5 mg/L), and treatment performance was evaluated through removal of turbidity, color, iron, manganese, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), organic matter, algae, and microbial indicators such as Total coliform (T. coli) and *Escherichia coli* (*E. coli*), alongside ORP response. Ozonation achieved high removal efficiencies at low doses (0.5 ppm), including turbidity (38%), color (61%), iron (57%), manganese (5%), Chemical Oxygen Demand (COD) (89%), algae (86%), Biochemical Oxygen Demand (BOD) (33%) However, ozone treatment showed limited effectiveness in bacteriological removal under the tested conditions, despite only a marginal Oxidation Reduction Potential (ORP) increase. In comparison, chlorine treatment at the same low dose (0.5 ppm) resulted in lower removal efficiencies, including turbidity (18%), color (50%), iron (20%), manganese (2%), Chemical Oxygen Demand (COD) (54%), algae (32%), and Biochemical Oxygen Demand (BOD) (33%). Chlorine treatment exhibited gradual improvement with increasing dosage and was highly effective in microbial disinfection. At dosages ≥1 ppm, complete removal of total coliform and *E. coli* was achieved. Additionally, higher chlorine dosages (4 ppm) resulted in significant reductions in turbidity, color, iron, and algae due to the presence of residual chlorine, with maximum removal efficiencies of 69.71%, 87.12%, 100%, and 94.5%, respectively. COD and BOD reductions were moderate compared to ozone. Chlorination exhibited a strong correlation between ORP elevation (>500–600 mV). The results demonstrate that ozone is more efficient for reducing organic load and algae, while chlorine was superior for bacteriological disinfection and removal of certain physicochemical parameters. The findings suggest that a combined treatment approach may provide an optimized solution for treating organic-rich surface waters such as Dry Aru.

Keywords:

Chlorine Treatment; Ozone Treatment; Surface Water; Oxidation Reduction Potential (ORP)

Abstract No: 2025_433

Assessment of $PM_{2.5}$-bound water-soluble anions during episodic air pollution events in Colombo Metropolitan City, Sri Lanka

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Particulate matter ($PM_{2.5}$) is a major air pollutant that poses significant environmental and public health concerns. The Colombo Metropolitan City (CMC) is influenced by multiple pollution sources, including urban emissions, industrial activities, and regional atmospheric transport. This study aimed to assess the concentrations and spatial-temporal variability of $PM_{2.5}$-bound water-soluble anions during episodic air pollution events in the CMC region.$PM_{2.5}$ samples were collected from six locations within the CMC between December 2025 and February 2026. Concentrations of major water-soluble anions (NO_2^-, NO_3^-, SO_4^{2-}, Cl^-, and F^-) were determined using ion chromatography (IC). Variability among sampling locations and periods was evaluated using descriptive statistical analysis. $PM_{2.5}$ mass concentrations were averaged at 17.5 µg m^{-3}, ranging from 2.7 to a maximum of 33.2 µg m^{-3}, which indicates considerable variability across sampling locations and periods (CV = 59.3%). Among the measured water-soluble anions, Nitrate and sulfate were the most abundant species, showing the mean concentration of 2.9 µg m^{-3} & 2.8 µg m^{-3}, and the maximum concentration of 13.5 µg m^{-3} & 6.8 µg m^{-3}, respectively. Chloride exhibited a mean concentration of 2.7 µg m^{-3} with a maximum of 9.5 µg m^{-3}. Nitrite and fluoride showed lower mean concentrations of 0.2 and 0.8 µg m^{-3}, reaching to maximum values of 0.6 and 7.4 µg m^{-3}, respectively. The high coefficients of variation (64.7–270.6%) observed for all ions indicate substantial spatial and temporal fluctuations in $PM_{2.5}$ chemical composition. . These findings suggest the influence of multiple pollution sources and atmospheric processes affecting $PM_{2.5}$ composition within the study area. In conclusion, $PM_{2.5}$-bound water-soluble anions exhibited substantial variability across the CMC during episodic air pollution events, highlighting the complex nature of urban air pollution and the need for continued monitoring of particulate matter composition.

Keywords:

Particulate Matter ($PM_{2.5}$), Water-Soluble Anions, Urban Air Pollution, Secondary Aerosol Formation, Colombo Metropolitan City

Acknowledgment:

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Abstract No: 2025_435

Isolation of eugenol from cinnamon leaf oil *via* alkaline extraction and methylation

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Cinnamon leaf oil, an underutilized tropical byproduct, offers a sustainable and low cost feedstock for the production of high value aromatic compounds. Eugenol, the major phenolic constituent of cinnamon leaf oil, was isolated and converted into methyl eugenol through a two-step process. First, eugenol was selectively extracted from cinnamon leaf oil using 5% sodium hydroxide solution to form water-soluble sodium eugenolate, followed by acidification with 5% sulfuric acid to regenerate free eugenol. The isolated eugenol was washed, dried over anhydrous sodium sulfate, and filtered. GC-MS analysis revealed that eugenol constituted approximately 64% of the original cinnamon leaf oil. In the second step, the purified eugenol was methylated with dimethyl sulfate under basic conditions. The reaction mixture was refluxed, and the product was isolated by liquid-liquid extraction, followed by washing, drying, and solvent removal using a rotary evaporator. Thin layer chromatography (TLC) using a hexane : ethyl acetate (7:3) solvent system was employed to monitor the reaction and compare the product with a standard methyl eugenol sample, confirming the formation of the desired compound. The synthesized methyl eugenol was obtained with ~94% purity (GC-MS) . The successful O-methylation was further confirmed by FTIR spectroscopy through the appearance of characteristic absorption bands corresponding to the methoxy group (1100–1250 cm^{-1}) and the disappearance of the phenolic hydroxyl stretch (3200–3600 cm^{-1}). This study demonstrates a simple and efficient laboratory scale method for the isolation of eugenol from cinnamon leaf oil and its conversion to methyl eugenol, offering potential for value addition to a locally available natural resource.

Keywords:

methyl eugenol, eugenol, cinnamon leaf oil, methylation, GC-MS

Acknowledgement:

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Abstract No: 2025_436

Sustainable Optimization of Modifier-Free Graphite Furnace Atomic Absorption Spectrophotometric Method for Trace Cadmium Determination in Seawater

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The determination of trace cadmium (Cd) in seawater is analytically challenging due to the high salinity of marine matrices, which induces significant non-specific absorption and spectral interferences in Graphite Furnace Atomic Absorption Spectrometry (GFAAS). Conventional methods rely on chemical modifiers to stabilize the analyte and suppress matrix effects; however, these additives increase analytical cost, introduce contamination risks, and conflict with the principles of Green Analytical Chemistry. This study presents the development of a sustainable, modifier-free GFAAS method for cadmium determination in seawater, coupled with a rigorous evaluation of measurement uncertainty to ensure metrological reliability. Cadmium analysis was performed using Zeeman-effect corrected GFAAS. Artificial seawater was prepared according to ASTM D1141-98 to simulate a marine matrix, and graphite furnace parameters were systematically optimized using a one-variable-at-a-time approach to reduce matrix interferences. The optimized temperature program (drying/pyrolysis/atomization: 150/800/1400 °C) substantially improved analytical performance. In comparison with the manufacturer's default program, the cadmium recovery increased markedly from 4.7% to 85.1% without the use of chemical modifiers. A further 2-fold dilution of the sample enhanced recovery to 103.7%, indicating effective mitigation of matrix effects. External calibration, matrix-matched calibration, and standard addition methods were assessed for quantification. External calibration under optimized conditions provided reliable results, while matrix-matched calibration showed signal enhancement effects. A comprehensive measurement uncertainty assessment was conducted in accordance with Eurachem/CITAC guidelines. The method demonstrated satisfactory analytical performance, with repeatability identified as the dominant contributor to the overall uncertainty budget yielding an expanded uncertainty of ±0.63 µg/L, equivalent to a relative uncertainty of 6.3%. The method achieved a limit of detection of 0.76 µg/L and is therefore suitable for routine monitoring of cadmium in seawater. The developed modifier-free GFAAS method provides a sustainable, cost-effective, and reliable approach for trace cadmium determination in seawater. By eliminating chemical modifiers while maintaining satisfactory analytical performance, the method supports Green Analytical Chemistry principles and offers a practical tool for routine environmental monitoring and desalination-related applications.

Keywords:

Cadmium, Seawater, GFAAS, Measurement uncertainty, Optimized Temperature Program

Acknowledgment:

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Abstract No: 2025_437

Sustainable synthesis of zinc oxide nanoparticles from spent coffee grounds as a reusable catalyst for Biginelli reaction

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Metal oxide nanoparticles (NPs) have attracted significant attention in organic catalysis for the development of recoverable heterogeneous systems. Plant-derived extracts are explored as sustainable alternatives to conventional synthetic capping and stabilizing agents for NP synthesis. Multicomponent reactions (MCRs), particularly the Biginelli reaction, provide an atom-economical route to synthesize 3,4-dihydropyrimidinone (DHPM) derivatives. In this study, zinc oxide (ZnO) NPs were synthesized via co-precipitation using spent coffee ground extract. The optical, structural, and morphological properties of ZnO NPs were characterized using ultraviolet-visible (UV-Vis) spectroscopy, Fourier Transform Infrared (FT-IR) spectroscopy, Powder X-ray diffraction (PXRD), and scanning electron microscopy with elemental dispersion (SEM-EDX) analysis. The catalytic activity and recyclability of ZnO NPs were evaluated for synthesizing DHPM derivatives via the Biginelli reaction, using benzaldehyde and its substituted derivatives. Product structures were confirmed by FT-IR, ^{1}H-NMR and ^{13}C-NMR. UV-Vis analysis revealed a characteristic absorption peak at 372 nm, while the FT-IR band at 505 cm^{-1} confirmed ZnO formation. The average crystallite size was calculated as 23.96 nm using Debye–Scherrer's equation, while SEM analysis revealed predominantly spherical particles with an average size of 56.6 nm. The results demonstrated moderate efficiency across substrates. The 4-nitro derivative gave the highest yield (81%), followed by benzaldehyde (69%) and 4-hydroxybenzaldehyde (63%). The 4-methoxy and 4-chloro derivatives yielded 58%. The recyclability of the ZnO nanoparticle catalyst was evaluated over four consecutive cycles, and the catalyst turnover number (TON) was calculated to be 13.0. These results indicate that ZnO NPs possess good catalytic activity, stability, and reusability for the synthesis of Biginelli derivatives.

Keywords:

atom-economical ; 3,4-dihydropyrimidinones ; heterogeneous ; multicomponent.

Abstract No: 2025_439

Study of Microplastic Contamination in Table Salt of Different Brands in Sri Lanka

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Plastic particles less than 5 mm in size are called Microplastics (MPs). The presence of microplastics in the environment and food items has become a global environmental and health issue. Although research on microplastic contamination of food items has gained global attention, studies addressing this issue are still limited in Sri Lanka. The objective of this study was to expand the present knowledge on MPs in table salts produced in Sri Lanka. Table salts of ten brands and two packets from each brand were used. Plastic free environment, duplicate analyses and blank experiments were carried out. Organic impurities in table salt samples were oxidized by treating with 30 % H_2O_2 (60o C, 24 h.). MPs were isolated, purified and dried. Abundance, shape and colour of isolated microplastics were studied by light microscopy, polymers were identified by Attenuated Total Reflectance-Fourier Transform Infrared Spectroscopy (ATR-FTIR) and open specy software. Scanning Electron Microscopy (SEM) showed 0.1 – 50 μm size microplastics. The average abundance of MP in table salts which were packed in plastic bags (856 particles kg^{-1}) was three times higher than those in glass bottles (270 particles kg^{-1}). In the studied ten brands of table salt, dominant shapes were fibers (73%) followed by fragments (24%). Seven different colours of MP were observed, and prominent ones were black (72%), red (15%) and transparent (10%). Seven types of polymers were identified; polyethylene (26%), polyethylene terephthalate (22%), polystyrene (19%), polypropylene (11%), nylon (15%), polyvinyl chloride (4%) and polyacrylonitrile (3%). The present study highlights the importance of avoiding plastic bags in commercially available table salt packets. Introduction of glass bottles is encouraged. Attention should be given on environmental conditions used during the production and storage processes, type of the packaging material and the transportation step.

Keywords:

microplastics, table salt, plastic free containers

Abstract No: 2025_440

Release of microplastics from tea bags produced in Sri Lanka

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Microplastics (MPs) are defined as plastic particles less than 5 mm in size. The presence of MPs in food items is not good. Ceylon Tea is globally recognized due to its unique aroma, rich colour and smooth taste. Objective of this study was to investigate whether tea bags produced in Sri Lanka would release MPs at brewing temperature (95 ^{o}C) into tea. Current knowledge on this subject is limited. Tea bag materials, tea leaves in those tea bags and the threads attached to tea bags of six tea brands were studied. Duplicate analyses and blank experiments were carried out in a plastic free environment. Tea bags containing tea leaves were emptied and MPs were extracted by treating with deionized water (95 ^{o}C, 5 min), followed by H_2O_2 treatment (60 ^{o}C), filtration, washing and drying. Abundance, shapes and colour of MPs were studied using the light microscope. Polymer composition was identified by Attenuated Total Reflectance – Fourier Transform Infrared Spectroscopy (ATR – FTIR). According to the Scanning Electron Microscopy studies, the size of MPs was 2 – 600 µm. Microplastics were observed in all the samples. The highest average abundance of MPs in tea bag material, tea leaves and the threads were 319000, 17625 and 62500 particles/kg respectively. Fibers were the most abundant shape of MPs extracted from tea bags (92%), tea leaves (81%) and threads (80%). Black was the dominant colour of MPs in tea bags (96%), tea leaves (78%) as well as in threads (81%). Other colours (blue, red, brown, orange, green, purple and transparent) were in low amounts (0 – 15 %). Ten types of polymers were present: polystyrene, polyethylene, polypropylene, polyethyleneterephthalate, polyurethane, polyacrylamide, polyacrylonitrile, polyvinyl chloride, polytetrafluoroethylene and polyvinylidene fluoride. Polystyrene was found in tea bag material, tea leaves as well as in threads. These findings suggest the importance of using non-plastic materials for tea bags and threads.

Keywords:

Microplastics, Tea bags, Tea leaves, Thread attached to the tea bag

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Abstract No: 2025_442

Enhanced Phosphate Adsorption Using Metal-Impregnated Coconut Coir Biochar: A Comparative Study of Al and Mg Modification

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Excess phosphate in aquatic systems is a major environmental concern, creating a need for efficient and sustainable adsorbents for nutrient removal. This study investigated the phosphate adsorption performance of pristine, Mg-modified, and Al-modified biochar derived from coconut coir, highlighting the potential of low-cost agricultural waste for water treatment applications. The novelty of this work lies in the comparative evaluation of Mg- and Al-impregnated coconut coir biochars and the relationship between their surface properties and phosphate adsorption behavior. Biochars were synthesized by pyrolyzing chemically treated coconut coir at 500 °C under nitrogen. The materials were characterized using pH at point of zero charge (pHPZC), methylene blue adsorption, iodine number, and FTIR spectroscopy to evaluate surface charge, porosity, and functional groups. FTIR analysis confirmed successful hydroxyl, aliphatic C–H, carbonyl, and aromatic C=C groups, along with metal loading through the presence of Mg–O and Al–O functional groups (~500–800 cm^{-1}), which provided additional active sites for phosphate adsorption. Pristine biochar exhibited moderate adsorption properties with limited microporosity (pHPZC = 8.98, MB value = 35.87 mg/g, iodine number = 69.39 mg/g). Mg-modified biochar showed increased pHPZC (10.15) and significantly enhanced microporosity (iodine number = 274 mg/g); however, its lower mesoporosity (MB number = 24.16 mg/g) reduced phosphate accessibility to active sites, resulting in relatively poor phosphate removal (13–16% over pH 2–8). In contrast, Al-modified biochar demonstrated superior adsorption performance, achieving a maximum phosphate removal of 81.5% at pH 8. The enhanced performance was attributed to favorable electrostatic interactions and the formation of stable aluminium–phosphate complexes. Overall, the results demonstrate that metal modification strongly influences the phosphate adsorption behavior of coconut coir biochar. Among the tested materials, Al-modified biochar showed the highest phosphate removal efficiency, indicating its potential as a selective, sustainable, and low-cost adsorbent for nutrient remediation in water treatment systems.

Keywords:

Mg- and Al-impregnated biochar; Phosphate removal; Coconut coir; Water treatment; Sustainable adsorbents.

Acknowledgment:

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Abstract No: 2025_443

In silico comparative analysis of curcumin and acarbose as inhibitors of human pancreatic alpha-amylase

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Human pancreatic α-amylase is an important therapeutic target for drug development to control postprandial blood glucose levels in Type 2 Diabetes Mellitus (T2DM). Curcumin, the main bioactive polyphenol of *Curcuma longa* (turmeric), was investigated for its ability to inhibit human pancreatic α-amylase through *in silico* molecular docking studies (PDB ID: 1B2Y; 1.50 Å resolution). Molecular docking simulations were carried out using the AutoDock Vina software to investigate the binding affinity and interaction profile of curcumin in the catalytic active region of the enzyme. From docking studies, it was revealed that the interactions of curcumin with key catalytic residues Asp197, Glu233, and Asp300, which are directly involved in the cleavage of the glycosidic bond, occur within the deep catalytic pocket of α-amylase. Curcumin showed binding strength similar to that of the common α-amylase inhibitor, acarbose, with a binding affinity of −7.3 kcal/mol. The interaction studies showed that the localized hydrogen bonding, hydrophobic contacts, and π-related interactions (π − σ and π-alkyl interactions with ILE396, VAL452 residues) favour the stability of the curcumin-enzyme complex. However, acarbose formed a wide network of hydrogen bonds with residues such as GLU438 and ARG10. Computational data suggest that curcumin has useful structural and physicochemical properties that allow it to interact with the catalytic region of human pancreatic α-amylase. Furthermore, this study highlights the importance of traditional medicinal plants like *Curcuma longa* in modern drug development research. The results indicate that curcumin may be a potential natural candidate for the development of anti-diabetic drugs for the future targeting postprandial hyperglycemia.

Keywords:

Alpha-amylase, Curcumin, Molecular Docking, Type 2 Diabetes, Ethnopharmacology

Acknowledgment:

The authors express their gratitude to the institute, research supervisors, and technical staff at the Institute of Chemistry, Ceylon, for providing the academic guidance and institutional support necessary to complete this study.

Abstract No: 2025_444

Sustainable Copper Detoxification Using Murraya koenigii Leaf Powder: A Low-Cost Biosorbent for Biomedical Applications

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Copper is an essential trace element involved in numerous biological processes; however, excessive accumulation can induce oxidative stress and severe cellular damage, as observed in Wilson disease. Synthetic drugs are the most commonly prescribed treatment for Wilson disease, promotes copper excretion but may be associated with adverse side effects, creating interest in alternative and complementary approaches for copper removal. This study investigates the potential of *Murraya koenigii* (karapincha) leaf powder as a sustainable, low-cost, and biocompatible biosorbent for Cu(II) removal from aqueous solutions under physiological conditions. Batch adsorption experiments were conducted by varying pH, contact time, initial Cu(II) concentration, and adsorbent dosage. Experimental conditions were optimized to simulate the gastrointestinal environment (pH 2–3, 37°C). The adsorption process is attributed to bioactive phytochemicals present in *Murraya koenigii*, including alkaloids, flavonoids, and polyphenols, which facilitate Cu(II) binding through chelation, complexation, ion exchange, and electrostatic interactions. Nitrogen-containing carbazole alkaloids are expected to play a significant role due to their strong affinity for Cu(II) ions. Fourier-transform infrared spectroscopy (FTIR) was employed to identify surface functional groups, while atomic absorption spectroscopy (AAS) quantified residual copper concentrations. FTIR analysis revealed the presence of hydroxyl, phenolic, and amine groups, suggesting their involvement in the adsorption process. Adsorption capacities of 0.1234 mg g^{-1} and 0.0852 mg g^{-1} were obtained at initial Cu(II) concentrations of 12.32 ppm and 5.83 ppm, corresponding to removal efficiencies of 33.14% and 48.71%, respectively. The results demonstrate that *Murraya koenigii* leaf powder is a promising biosorbent for copper removal. This study provides insight into the adsorption mechanism and establishes a foundation for future investigations on adsorption isotherms, kinetics, and sustainable copper detoxification under simulated physiological conditions, thereby linking with potential biomedical applications.

Keywords:

Murraya koenigii, Biosorption, Cu(II) removal, Copper detoxification, phytochemicals

Acknowledgment:

The authors gratefully acknowledge the facilities and financial support provided by the Institute of Chemistry Ceylon (IChemC).

Reminiscing Emeritus Professor J. N. O. Fernando

The year 2026 marked the 82nd Birth Anniversary and 11th Death Anniversary of Emeritus Professor J. N. O. Fernando, who was born on 29th February 1944 and died on 02nd March 2015. In his memory, Institute of Chemistry Ceylon organized the annual commemoration ceremony on 27th February 2026 at the Adamantane House. Among the guests present were family members of late Professor Fernando, members of the institute, academics, staff, alumni, students and well-wishers.

The proceedings were opened by Emeritus Prof. Hema Pathirana, President of IChemC, who welcomed the gathering. Commemoration ceremony encompassed Christian prayer by Father Suren Watson, musical tribute by Music Circle of CCS and the memorial oration. The orator citation was read by Dr. A. A. P. Keerthi, Senior Lecturer of CCS and the memorial oration was delivered by Mr. Mevan Pieris, Past President of IChemC & renowned polymer technologist. Mr. Pieris who knew late Professor Fernando for more than six decades since his schooling days at St. Thomas College, highlighted his leadership qualities during the oration titled "Fond Remembrances of Professor J. N. O. Fernando".

Dr. Dineth Samarawickrama, Chairman of the Professor J. N. O. Fernando Memorial Committee, made the concluding remarks and the ceremony brought to an end with garlanding the statue of late Professor Fernando. Thanks to the contributions made by IChemC members, staff, alumni, well-wishers and Prof. Fernando's family members, a donation consisting of hygiene and personal care products, was presented to the Victoria Home for Incurables in conjugation with the commemoration ceremony.

11th Emeritus Professor J. N. O. Fernando Memorial Oration

Fond Remembrances of Jerence Nansel Oleap Fernando

Mevan Pieris

Past President, Institute of Chemistry Ceylon & Renowned Polymer Technologist

Jerence Nansel Oleap Fernando was born under extra-ordinary circumstances as an extra-ordinary child. It was a time when the Second World War was in full cry with great atrocities being perpetrated by man. The British Empire to which Ceylon belonged then, stood threatened by Hitler on one side and by the Japanese war machinery on the other side. Yet for all, God of Love had reigned supreme at Pilberine Gardens, Moratuwa, and the news was broken that the lady of the house had found favour once more. Such joyous news must have brightened the mood of them that dwelt there, at a time when Japanese bombs had begun to fall on Colombo, and a plane was shot down not too far away at S. Thomas' College Mt Lavinia, where the new born was destined to stamp his class. So, in the leap year under extra-ordinary circumstances the fourth child of Osman and Emerine Fernando saw light of day on the 29th of February 1944. Needless to say, the baby's cries would have brought tears of joy to all at home at a time close to noon, when the sun was yet on its upward journey on that leap day, and taking the letter O from the father's name, Oleap was to be the name.

Oleap Fernando entered S. Thomas' College at the age of 7 years. A couple of years later it was my good fortune to enter the same school by the sea, and more so to come to know JNO. Pilberine Gardens offered ample space for youthful exuberance and there he grew up under the watchful eye of his parents in the rich traditions of the Christian faith. Those were the days when Canon Reginald de Saram who had taken Greats at Oxford was Warden, and mathematics was taught by a distinguished Cantabrian, the Revd. Bowyer Yin, who was also the chaplain and choir master. They were the days when JNO and I would start each term by offering praise to God in the Chapel of the Transfiguration, with the words of the Psalmist, "*I will lift up mine eyes unto the hills from whence cometh my help ...*". They were also the days when we learnt classical Hela Sinhala, at the feet of immortals such as Pinto Jayewardene and Ariyasena Ashuboda. The lower school where JNO

and I began our schooling stood against the sprawling playing fields across which the balmy breezes of the Indian ocean blew. They were also the days when JNO and I would sprint across to the modest tuck shop which stood beside the railway track, to enjoy a plate of string-hoppers, meat curry and pol-sambal which Samaris would serve, for a princely sum of 35 cents. They were also the moments when we would return with plate stretched out asking for a bit more gravy, in the same way as Charles Dickens' Oliver Twist had done.

I can never forget the Tuesday morning assembly when the entire lower school would gather before Head Master Revd. J. Y. Barnabus, under the shade of two Barintonia trees. There we would assemble each week to cheer the first in class collect his weekly report from the mighty hands of that burly Indian; and each week, JNO would scale the flight of steps which separated the Head-master from them that provided the cheers. Those were the moments and times when teacher and colleague heaped respect on rising stars. Year after year at the College prize-givings, the young Fernando carried away every imaginable prize, whether it be languages, religion, mathematics or sciences. His was a remarkable all-round mind; good in every subject. All eyes were on JNO as he entered the upper 6C form, well known in those times to be the class of the college, where the brightest 20 students were brought together, to be taught by the best of teachers, so that the best possible results could be obtained for the school in the first public examination. It was indeed my good fortune that by some stroke of luck I too entered the same class a couple of years later to be in the company of my very good friend G. L. Peiris, the brightest of us all, now known to all as 'the brilliant professor in law turned politician'. All hopes and expectations were pinned on Oleap that year to come up with a sterling performance which would do his school proud, when the news ran around the College that the young star was afflicted with a fever which refused to leave. Prayers were offered in the chapel to the Almighty, by both pious and not so pious, for a speedy recovery of Fernando whose ailment the doctors had diagnosed to be a congenital defect in a small duct that led to the heart which required immediate surgery. Oleap would hear nothing of it, and insisted that the use of the doctor's scalpel be delayed until he finished with the examinations, and opted for a course of penicillin injections, which were administered on a daily basis upward of a month. Even the class room was shifted to the ground floor to prevent the straining of his little heart. The examinations were done under trying conditions, but when results were announced, Oleap had secured five distinctions in one sitting; a rare feat then. Needless to say anxiety still prevailed as to what the outcome of the heart condition would be as Oleap was wheeled into the operating theatre. Although the operation itself was a success, where the duct was concerned, due to an accidental damage of some nerves, Oleap's speech was affected, converting his voice to a more musical version.

Resilience of Oleap Fernando was soon clearly visible as he prepared for the university entrance examination. The prospect of securing a Doctorate in a science discipline was more attractive to the young mind than pursuing a professional career in engineering or medicine which was there for the asking. As was expected, JNO came off with flying colours, securing A grades in all four subjects, chemistry, physics and double mathematics, recording the best results in the Island. Oleap entered the science faculty of the University of Ceylon, and read a special degree in chemistry with physics as subsidiary and graduated with an upper second class. He was also the recipient of the Khan Gold Medal for the best performance at the 1966 final examinations. This was one more feather in his cap which was already looking like that of a Red Indian.

Soon after graduating, Oleap began his professional career as an assistant lecturer in chemistry, at the University of Ceylon, Peradeniya, and thereafter served in the same capacity at University of Ceylon, Colombo. In 1968, he followed a short course of studies on radio isotopes at the Australian school of Nuclear Technology, New South Wales, before entering Imperial College, University of London, as a Commonwealth postgraduate scholar, to prosecute his PhD research studies, under the supervision of Professor F. C. Tompkins. Oleap studied heats of adsorption of diatomic gases on tungsten using the calorimetric method and obtained his PhD in 1971. Thereafter he returned to Sri Lanka and dedicated himself as a tertiary level teacher of physical chemistry and married Miss. Mandrupa Fernando

soon afterwards. In 1973, he became a member of the Institute of Chemistry Ceylon, and of the Sri Lanka Association for the Advancement of Science, and took a keen interest in professional activities. In 1977, making use of his first sabbatical, Oleap left for the University of Manchester Institute of Science and Technology, where he furthered his knowledge in the area of surface chemistry, by chromatographic determination of isosteric heats of adsorption on zeolites. On his return he was in charge of the Physical Chemistry laboratory of the University of Colombo. During this period, Professor R S Ramakrishna was the President of the Institute of Chemistry Ceylon, and advocated that the Institute embarks on a Graduateship course of studies, which was really the brainchild of the Institute's first President, Dr. M. A. V. Devanathan. The young JNO, a fountain of energy and enthusiasm, was the logical choice to act as the founder coordinator of this course of studies, and was so, in the formative years from 1978 – 1983. The very suggestion of conducting a part time course of studies in chemistry with preposterous claims of equivalence of a full time special chemistry degree conducted by the universities, was viewed as heresy by many a giant of chemistry of that period. Yet for all, the Institute went forward sans lecture halls, laboratory, and library of their own, by conducting lectures at Aquinas College with a handful of dedicated teachers lecturing to an inaugural batch of 74 students, with disastrous consequences, as only a handful completed the course. Professor Ramakrishna provided the much needed leadership, and during the formative years served as the Chairman, Educational Committee, from 1981 – 83, before handing over to JNO. In Professor Ramakrishna, the Institute had a person of great vision and strength, and in JNO, he had an able lieutenant. Ill winds soon blew over the course within a year, drifting it to class rooms of S. Thomas' College Mt. Lavinia.

Ladies & gentlemen, in 1982, JNO was elected a Vice-President of the Institute and became President two years later. It was my honour to have been invited by him to be a Joint Secretary of the Institute, and enjoyed a very close working relationship with him. Together with JNO, we were able to achieve much. A new constitution was drafted by the two of us, spending many an hour at the SLAAS building where the Institute's modest office then stood. On my suggestion, Chemistry in Sri Lanka was launched as a journal, and the first copy was presented to His Excellency J. R. Jayewardene. He also agreed to my suggestion to introduce a Presidential medal to be worn at the Annual Sessions, but alas, the valuable large sterling silver medal which was donated by me, has since disappeared. We introduced a colourful Annual Sessions, and also produced a Manual of the Chemical Industry with Clodagh Nethsinghe serving as editor.

In 1984, an opportunity arose for JNO to assume duties as Professor of Chemistry at the newly formed department of chemistry of the Open University at Nawala. He served in this capacity for thirty long years, and during this period also assisted many other universities as a visiting lecturer. However, his life blood was the Institute's Graduateship programme, sharing from time to time the responsibility of being Chairman of the Educational Committee, with other pioneering lecturers, such as, Professor E. R. Jansz and Professor H. D. Gunawardhana. Yet for all, he was unmistakably the live wire, with a penchant for safe guarding the coffers which the course was now yielding in abundance. A special silver medal was conferred on him during the Silver Jubilee celebrations of the Graduateship Course, in appreciation of his loyal dedicated services, although in an analysis done by me covering the same period, showed that the operational efficiencies of the Graduateship course, left much to be desired, as only 17% of a large population of more than 2000 students who had registered in the first twenty-five years, had been able to complete the course. Although visibly shaken by the revelation, JNO was quick to compliment me on the detailed analysis which I presented, but was not slow either, to take some credit for himself, by equating low passes to high standards maintained. About this time, JNO was instrumental in persuading me to shoulder the responsibility as Chairman Building Project Committee, in erecting the Institute's building at Rajagiriya and on its completion the building was named as Adamantane House by him, and requested me to write an article on Adamantane, which appeared in Chemistry in Sri Lanka Vol. 22 No. 3, September 2005. It stirred a hornets' nest when I pointed out that the structure of the Institute's logo, meant to be that of Adamantane, had been incorrectly drawn. JNO was large enough to accept my point of

view, but got round the problem by saying that the structure in the logo need not be precise, as the name of it did not appear beneath it. So the spacial structure of Adamantane which should be that of a chair shaped single cage of the diamond lattice, continued to remain more like a Vesak lantern rather than a chair.

Ladies & gentlemen, Oleap Fernando's academic excellence and dedication to duty requires no further elaboration. Whilst this is common knowledge, he excelled best as a leader in the professional world. He presented himself as a principle centred leader whose fountain of success emanated from a combination of competency and good character. Oleap enjoyed a high degree of trust and confidence of his peers and this indeed is a characteristic of great leaders whose personality crystallizes from the noble teachings which empower and exalt their spirit. Professor Stephen Covey states that, the strengths of such leaders radiate in four directions, with a sense of Guidance, Power, Security and Wisdom. They are guided by the values, norms, and other criteria which fashion their conscience and which help them to make decisions giving them a sense of security, personal strength, identity and self esteem. In short these basic strengths translated themselves to create the power that was in him. Power is the vital energy that enabled him to make choices and decisions, and above all, the capacity he had to continuously improve and even correct himself. On the other hand, Oleap was a man of knowledge and experience, the two sacred ingredients that create wisdom, which provides a holistic understanding to make prudent judgements. The power and wisdom in him enabled Oleap to make major adjustments to the Graduateship course syllabus and methods of assessment, to overcome the poor performances. The syllabus was enlarged by introducing several new optional subjects, and examinations were conducted every semester testing the level of understanding rather than memory. This brought about drastic improvements in the passes and also paved the way for me to become a lecturer in the disciplines of Management, and Polymer Chemistry & Technology.

Ladies & gentlemen, Principle Centred Leaders enjoy inspiring literature and are intellectually active, leading balanced lives. JNO was a voracious reader who also found time to see life as an adventure. On the 26th of December 2004, Oleap had just finished a dip in the Hikkaduwa seas, when the ocean rose with devastating power, to pulverize the entire coastline. God had moved in a mysterious way, his wonders to perform, and spared the life of Oleap to continue his labour of love in the noble profession he had chosen.

He was a leader that continuously maintained the four dimensions of his human personality, namely his, physical, mental, emotional, and spiritual self. Goodness of character is the primary greatness on which he had built his secondary greatness of social status, position, fame, and skill. He was a leader who used powerful ethical methods to influence others and did so by example, fostering caring relationships among staff and students. He was also an audible mentor who instructed loudly and clearly for all to hear. His passion for work developed a sense of intrinsic worth that commanded the respect of others. Selfless service is one of the most powerful tools of influence.

Ladies & gentlemen, Oleap had many a quality associated with great leaders. Ability to make decisions was his forte. If as a young boy he was able to make a bold decision to postpone life and death surgery to give priority to accomplish the task at hand, there indeed were the makings of a courageous leader. It was William Shakespeare who said in As You Like It, that "*Some are born great, others achieve greatness and some others have greatness thrust upon them*". Oleap's greatness was in his achievements. He was a man with a passion for achievement and was committed to make the Institute a success story. He had the crucial trait of being able to define his vision, so that others could rally around him.

Ladies & gentlemen, the four key Es that provided superior leadership qualities stand for, Energy, Energizer, Edge and Execution. He had an abundance of energy and a capacity to energize or motivate others. The edge in the leader is the competitive spirit in him. It was the edge in him which kept revising the Graduateship course syllabus to produce graduates with a much better understanding of the chemistry & technology of several manufacturing industries, in comparison with Graduates of other universities. The energy and edge are useless, unless the leader had the capacity to execute the plans. Ladies & Gentlemen, these four Es lead to the guts, head and heart of the

leader.

Ladies & Gentlemen, the energy in JNO was paramount and he would move from place to place untiringly and would participate in a range of Associations where he was a familiar figure. At the Sri Lanka Association for the Advancement of Science he was an active member and General President in 2001. Thanks to him I served as the President of the Chemical Sciences Section. Oleap also functioned as the Director of the Asian Chemical Education network of the Federation of Asian Chemical Societies. His presence at meetings always provided the excitement and more often than not, a surplus of energy would erupt with volcanic propensity in characteristic style.

Like all great leaders he was a man of determination, who led by example. Throughout his long association with the Institute he had been a great example of dedication to duty and the perfect example of a forthright man of independent character. He displayed resolute courage in being outspoken and I dare say, even at the cost of antagonizing many a professional. He was highly critical of the educational policies of the State and the university system, thereby earning the wrath of them that stood in high positions. He was prepared to sacrifice positions of high authority in the formal education system of the country in exchange for the values and principles that were dear to him. He was a person with high initiative and had a remarkable mind which was a fountain of ideas. He was a man of confidence which resulted from the knowledge he carried, and made commitments and took responsibility for his actions. He was never ashamed to apologize for any lapses. Ladies & gentlemen, His loyalty to the Institute and to the cause of tertiary chemical education was supreme, kindling in him a sense of duty unmatched by all other leaders. "Ille Dux Ducum Erat". That man was the leader of leaders.

Ladies & Gentlemen, he was a Leader who readily recognized those who made a significant contribution to the Institute. In April 2014, I was greatly honoured to receive from him, a large wall hanging of pressed orchids with the wording, "*presented to H. S. M. Pieris, C.Chem, in grateful recognition of yeoman services rendered towards educational activities in an honorary capacity*"

Ladies and gentlemen, on Saturday the 28th February 2015, I was at the Institute's car park, when JNO walked up to me and spoke of his illness briefly. He seemed not to be too worried about his obviously serious condition and seemed happy that his condition which had been pretty bad a few days previously had improved considerably on account of the drugs that had been administered. I asked him why he was not resting and all he had to say was that he was feeling much better and that the doctors were planning to remove the cancerous region of the colon in a few days. He bade me farewell before being homeward bound. I never realized then that it was to be the last conversation with him. The following day, Sunday 01st of March, was his birthday, and he had spent a sleepless night that day, with sweat and blood soaking his pillow. His courage and strong mindedness were to overtake rational thinking, for he stood in the way of Mandrupa calling for help. He probably felt that his hour had come and had refused to go in an ambulance, and insisted that he drives his own car to hospital, but not before a few emails were sent out by him. No sooner he had reached the hospital he had collapsed. On Monday, 02nd March, around noon I received the shocking news that death had visited JNO, a day after his 71st birthday.

Ladies & Gentlemen, He was called upon to leave at the feet of death, the full vessel of his life; all the trophies, earnings and gleanings of summer years, and start a new journey into the unknown. His departing voice would have surely echoed the words of that great Indian poet, Rabindranath Tagore. '*I have brought nothing to this world and take nothing away. I have started my journey with empty hands and expectant heart. Let this be my parting word, that what I have seen is unsurpassable. I have tasted of the honey of the Lotus that expands on the ocean of light and thus I am blessed – let this be my parting word. At this time of my parting, wish me good luck, my friends. The sky is flushed with the dawn and my path lies beautiful*'.

Ladies and Gentlemen, he came to this world of gloom in as much as the brightest of stars shall appear in the darkest of skies. A leader to be, a vision to have, and a mission to fulfill in selfless sacrifice and dedication to duty. I take pride that I was able to answer his call and erect the Institute's building a mission he longed to fulfill. I take joy in having had a hand in naming a hall in his honour, and thank God for the power in my hands

and eyes, that enabled me to create a portrait of him, which is robust and psychologically forceful, to adorn the walls of that hall, to posterity. He was not slow in expressing his gratitude to me by presenting me on 28th June 2005, a beautiful wall hanging, which I greatly treasure, and with the writing, "Presented to Mevan in grateful appreciation of his labour of love in painting and gifting my portrait that hangs gently on the walls of the JNO Fernando hall". Ten years later, he crossed the great divide from where no man returneth, but indeed, continues to hold communion with us.

As the psalmist, J. M. Neale (1818-66) has written,

"*They whose course on earth is o'er, think they of their brethren more. They before the Throne who bow, feel they for their brethren now. We, by enemies distrest, they in paradise at rest. We the captives – they the freed, we and they are one indeed. Saints departed even thus, hold communion still with us. Still with us, beyond the veil, praising, pleading, without fail*".

As the great negro emancipator, Horatius Bonar has said in 1857, JNO Fernando shall always be remembered by what he has done.

"*Fading away like the stars in the morning; Losing their light in the glorious sun. Thus would we pass from the earth and its toiling; only remembered by what we have done.*

Only the truth in life we have spoken; only the seed that on earth we have sown; These shall pass onward when we are forgotten, fruits of the harvest and what we have done".

Ladies & Gentlemen, pardon me if I have gilded the lily somewhat. But the occasion demands of me that I say nothing but the very best.

De Mortuis Nihil Nisi Bonum (of the dead say nothing but good).

In conclusion, I thank the President of the Institute, and the organizing committee for inviting me to deliver this oration, in memory of a truly great educationist, a fellow Thomian, a fellow chemist, and of a loyal friend. I thank you all, for your presence and patient hearing. Thank You!

11th Emeritus Professor J. N. O. Fernando Memorial Oration

27.02.2026 **Adamantane House, Rajagiriya**

Welcome address by the President Emeritus Prof. Hema Pathirana

Mr. Mevan Pieris conducting the memorial oration

Christian prayer by Fr. Suren Watson

Musical tribute by Music Circle of CCS

Presenting token of appreciation to Mr. Mevan Pieris

Distinguished invitees and the audience witnessing the event

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