Centre of Excellence for Advanced Materials Research (CEAMR)

K.R. Mangalam University, Gurugram

Annual Report 2024–25

Vision

The Centre of Excellence for Advanced Materials Research (CEAMR) at K.R. Mangalam University aspires to be a world-class hub for interdisciplinary research, innovation, and technology development in advanced materials science. Our vision is to address the challenges of sustainability, energy efficiency, and next-generation technologies by advancing the frontiers of materials research through collaboration, creativity, and innovation.

Mission

- To foster high-quality research in the field of advanced materials science and engineering.
- To provide state-of-the-art infrastructure and facilities for cutting-edge research.
- To nurture young researchers and scholars through interdisciplinary collaborations.
- To establish strong linkages with industries, national laboratories, and international universities.
- To promote innovation and entrepreneurship in the field of materials research.

About the Centre

The Centre of Excellence for Advanced Materials Research (CEAMR) was established at K.R. Mangalam University, Gurugram, with the goal of advancing interdisciplinary research in materials science and engineering. The Centre provides a platform for faculty members, research scholars, and students to engage in high-impact research projects in areas such as nanomaterials, multiferroics, functional polymers, biomaterials, energy-efficient devices, composites, and thin films.

Objectives

1. To undertake advanced research in materials science with applications in electronics, energy, environment, and healthcare.
2. To develop interdisciplinary projects bridging physics, chemistry, and engineering.
3. To train the next generation of scientists and engineers through PhD and postdoctoral programs.
4. To strengthen industry-academia partnerships for translational research.
5. To publish high-impact research papers and file patents.
6. To organize national and international conferences, workshops, and invited lectures.

Highlights of 2024–25

- Establishment of new synthesis facilities for nanomaterials and thin-film fabrication.
- Submission of multiple research proposals to SERB, DST, and industry collaborations.
- Organization of one international conference.
- Research publications by centre members in reputed journals.
- Hosting of over 20 PhD scholars engaged in frontier research projects.

Research Team (Faculty Profiles)

Director – Dr. Diwakar Padalia

PhD in Materials Science with over 20 years of research experience in nanomaterials and thin-film deposition techniques. Published extensively in high-impact journals and leads multiple sponsored projects.

Associate Director – Dr. Prabhakar Bhandari

Expert in solid-state chemistry and material synthesis. Has contributed to the development of multifunctional composites and has strong collaborations with industry partners.

Associate Professor of Chemistry – Dr. Chandra Mohan

Dr. Chandra Mohan is an accomplished researcher in inorganic and physical chemistry, with expertise in coordination compounds, catalysis, and environmental applications of advanced materials. He has guided several postgraduate and doctoral students and has published research articles in reputed international journals. His current work focuses on green chemistry approaches and materials for water purification and energy storage.

Assistant Professor of Chemistry – Dr. Neeraj Kumari

Dr. Neeraj Kumari specializes in organic chemistry and analytical techniques, particularly the development of eco-friendly synthetic pathways and nanomaterial-assisted catalysis. She has a keen interest in spectroscopic characterization methods (FTIR, UV-Vis, HPLC) and has contributed to interdisciplinary projects bridging chemistry and materials science.

Associate Professor of Mechanical Engineering – Dr. Kaushal Kumar

Dr. Kaushal Kumar has research expertise in advanced manufacturing processes, composite materials, and mechanical behavior of engineering alloys. He has collaborated with industries in the automotive and aerospace sectors, focusing on high-performance and lightweight materials. His ongoing

projects involve additive manufacturing and testing of nanocomposites for structural applications.

Associate Professor of Pharmaceutical Sciences – Dr. Sucheta

Dr. Sucheta is an experienced academic in pharmaceutical sciences with a strong research background in drug delivery systems, biomaterials, and pharmaceutical formulations. Her work integrates chemistry, biology, and materials science to design novel therapeutic agents. She has received recognition for her contributions to polymer-based drug carriers and nanomedicine. Professor of Physics – Dr. Pawan Kumar

Professor of Physics – Dr. Pawan Kumar

Specialist in multiferroic materials, econophysics, and magnetic thin films. Over 18 years of teaching and research experience with publications in reputed journals. Plays a key role in mentoring PhD scholars.

Associate Professor of Chemistry – Dr. Seema Raj

Research focus on polymer chemistry, green synthesis, and materials for environmental remediation. Leads the centre's chemistry research wing.

Associate Professor of Physics – Dr. Dilrajpreet Kaur

Works in experimental condensed matter physics with specialization in dielectric and ferroelectric properties of functional oxides.

Associate Professor of Mechanical Engineering – Dr. Surendra Kumar Yadav

Expertise in advanced manufacturing, composites, and mechanical testing of novel materials. Brings engineering applications to materials research.

Assistant Professor of Mechanical Engineering – Dr. Imran Siraj

Researcher in advanced machining and sustainable engineering materials. Contributes to projects on structural materials and mechanical characterization.

Assistant Professor of Physics – Dr. Nitish Yadav

Focuses on nanostructured semiconductors for optoelectronic devices. Published in reputed journals and supervises young researchers.

Assistant Professor of Physics – Dr. Rishi Ranjan Kumar

Specializes in computational materials science and density functional theory (DFT) simulations. Leads theoretical and modeling research.

Assistant Professor of Physics – Dr. Rajni Gautam

Works on experimental thin-film deposition, ferroelectric materials, and device applications. Active in collaborations with national labs.

Research Facilities Available

- FTIR Spectroscopy – Structural and bonding analysis.
- TGA/DTA/DSC – Thermal stability and phase transition studies.
- LCR Meter – Electrical and dielectric property measurements.
- UV-Vis Spectrophotometer – Optical absorption analysis.
- HPLC – Chemical analysis and purity testing.
- Furnaces & Ovens – Heat treatment and sintering of materials.
- Materials Synthesis Facility – Sol-gel, hydrothermal, and solid-state synthesis methods for nanomaterials and composites.

About Central Instrumentation Facility under CEAMR:

The Central Instrumentation Facility (CIF) had a productive and dynamic year in 2023, continuing its mission to provide cutting-edge analytical instrumentation, expert technical support, and advanced training to empower research and innovation across K. R. Mangalam University. Key highlights include:

- **Significant Increase in Usage:** Instrument usage hours increased by 75% compared to FY-2023-24, reflecting growing research demand.
- **Enhanced Training:** Launched 3 specialized workshops/training sessions and trained over 250 users.

- **Research Impact:** Instrumentation directly supported 5+ peer-reviewed publications and 7 grant proposals.
- **Operational Efficiency:** Implemented a new online booking and billing system, improving user experience and resource management.
- **Focus on Sustainability:** Initiated an instrument lifecycle assessment and optimization program.

The CIF remains committed to maintaining world-class facilities, fostering interdisciplinary collaboration, and driving the research excellence of K. R. Mangalam University.

Vision & Mission

The Central Instrumentation Facility serves as the core shared-resource facility for advanced scientific instrumentation at K. R. Mangalam University. Our mission is to:

- Provide access to state-of-the-art analytical and research instrumentation.
- Offer expert technical consultation, training, and support services.
- Foster interdisciplinary research collaboration.
- Ensure the optimal operation, maintenance, and utilization of shared resources.
- Promote best practices in instrumentation and data analysis.

This report details our activities, achievements, challenges, and future direction for the financial year 2024-25.

Facility Overview & Instrumentation

The CIF currently houses and manages 6 major instruments across one specialized laboratories/locations.

Core Technology Areas:

- Thermogravimetric Analysis, and Differential Thermal Analysis (TGA, DSC)
- Spectroscopy (FTIR, UV-Vis)
- Dielectric measurement (LCR)
- Materials synthesis (Programmable laboratory chamber furnace, Refrigerated Centrifuge, magnetic stirrer)

- Rheology (Rheometer, Rotational Viscometer)

Key Instrumentation Updates (2023):

- **Major Upgrades:** Lab Solutions Software (Shimadzu,, Japan) purchased for UV-Vis (Shimadzu, UV-1800).
- **Decommissioning:** Retired legacy HPLC Model LC 20AD after 09 years of service.
  (See Appendix I for Complete Instrument Inventory & Status)

Usage Statistics & User Base

The CIF experienced robust demand across all user groups in 2023.

- **Total Users:** 212 (75% increase from 2023-24).
- **Active Registered Users:** 79
- **User Distribution:**
  - Internal Academic (Faculty/Students): 66
  - Internal Administrative/Other: 10
  - External Industry: 3
- **Most Utilized paid facility:**
  1. TGA – 31 samples
  2. FTIR - 30 samples
  3. UV-VIS - 15 samples
  4. DSC - 11 samples

Services & Support

The CIF provides comprehensive support beyond instrument access:

- **Training Programs:**
  - Trained 45 new users on DSC and TGA, 10 on programble muffle furnace and 70 students on rheometer
  - Developed and launched hands on practice on TGA.

- **Data Analysis Support:** Offered specialized support for TGA, DSC, FTIR, UV-Vis, dielectric spectroscopy data analysis.

Research Impact & Highlights

CIF instrumentation and expertise are integral to the research success of our institution:

- **Publications:** Instrumentation/data from the CIC were acknowledged in 5 research articles. (details are in Annexure C)
- **Professional Development:** Staff attended 13 conferences/workshops
- **Expertise:** Staff collectively hold deep expertise in spectroscopy, thermal data analysis and theo;ogy.

8. Financial Overview (Summary)

- **Revenue Generated:** 1,28,850 (detailed information is in Annaxure 2).
- **Capital Expenditure (Software):** Rs 21,240 funded through K.R. Mangalam University..

Challenges & Mitigation

- **Challenge:** Increasing demand leading to booking constraints on high-use instruments.
    - *Mitigation:* Optimized scheduling protocols; exploring extended hours/shifts; actively pursuing funding for duplicate high-demand instruments.
- **Challenge:** Rising costs of maintenance contracts and consumables.
    - *Mitigation:* Negotiating multi-year contracts; implementing stricter consumables tracking; exploring alternative vendors where feasible; advocating for sustainable funding models.
- **Challenge:** Need for continuous staff training on rapidly evolving technologies.
    - *Mitigation:* Dedicated professional development budget; encouraging vendor training; fostering knowledge sharing within the team.

Future Directions & Goals (2025-26)

Building on 2024-25's momentum, key objectives for 2025-26 include:

1. **Strategic Acquisition:** Pursue funding and acquire a Advanced X-ray Diffractometer and Particle size analyser.
2. **Enhanced Data Management:** Implement a centralized data storage and management platform for CIF users.
3. **Expanded Training:** Develop advanced/application-specific training modules and increase online training resources.
4. **User Engagement:** Increase outreach through regular seminars, newsletters, and an annual user symposium.
5. **Extension of synthesis lab :** Formalize instrument lifecycle management and energy efficiency programs.
6. **Industry Partnerships:** Develop structured programs to enhance engagement and collaboration with industry users.
7. **Staff Development:** Implement a centralized Advanced material research lab facility for state of art synthesis facilities.

Acknowledgements

The CIF gratefully acknowledges:

- The continued strategic support and funding from K.R.Mangalam University leadership, and Research and Development Cell.
- The dedication and expertise of the entire CIF staff.
- Our vibrant user community for their collaboration, feedback, and commitment to advancing research.

Future Plans of CEAMR (2025–26)

- Expansion of materials characterization laboratory with XRD and SEM.
- Launch of an annual journal on Advanced Materials Research.
- Establishment of industry-incubation centre for startups in materials science.
- Collaboration with international universities for joint PhD programs.

Appendix

- **Appendix A:** Complete Instrument Inventory List
- **Appendix B:** Detailed Usage Statistics by Instrument & Department
- **Appendix C:** List of Publications
- **Appendix D:** Conference conducted

Contact Information:
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Bhaskaracharya Block, B-409
K.R.Mangalam University
Sohna Road, Gurugrm
Website: https://www.krmangalam.edu.in/research centres

Appendix A

(Complete Instrument Inventory List)

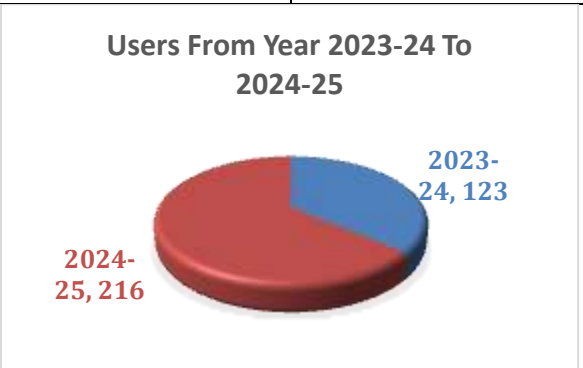
S.N.	Instrument Name	Model	Manufacturer
1	Simultaneous Thermal Analyzer	Discovery SDT 650	TA Instrument, USA
2	FTIR Spectrometer	Nicolet Summit X	Thermo Fisher Scientific, USA
3	UV/Visible Spectrophotometer	UV-1800	Shimadzu, Japan
4	Programmable laboratory chamber furnace	CWF1313-230SN	Carbolite Gero
5	Rheometer	Premium Series	Fungilab, France
6	LCR meters	NF2376	NF Corporation, Japan
7	Rotational Viscometer	DV-E	Brookfield,
8	Refrigerated Centrifuge		Metropolitan Scientific, India
9	Ultrasonicator	45kHZ, 100W	Metropolitan Scientific, India
10	Pellate Making kit	15 Ton	Transfotech India Ltd., India
11	Hot Air Oven		Metropolitan Scientific, India
12	Magnetic Stirrer	2L	Metropolitan Scientific, India
13	Flame photometer		Metropolitan Scientific, India
14	Conductivity meter	LT16	Labtronics
15	HPLC	Prominence	Shinadzu, Japan
16	pH meter	LT11	Labtronics

Appendix B

(Detailed Usage Statistics by Instrument & Department)

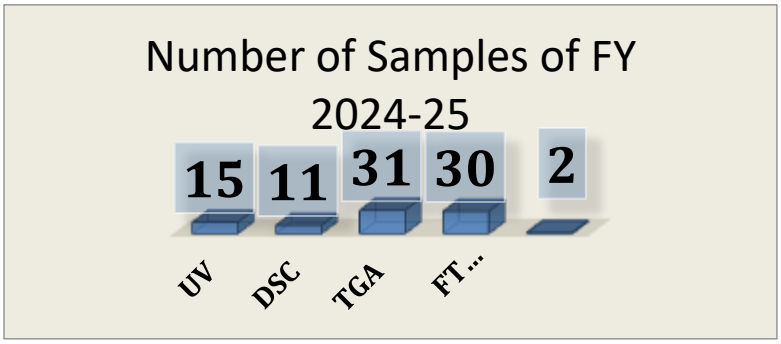
[A] List of facility users

FY 2024-2025	FY 2023-24
216	123

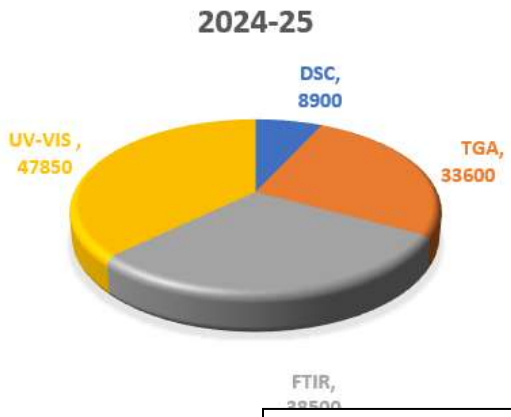


[B] Number of samples in different paid facility users

FY2024-25	UV	DSC	TGA	FTIR	MUFFLE
NUMBER OF SAMPLES	15	11	31	30	2

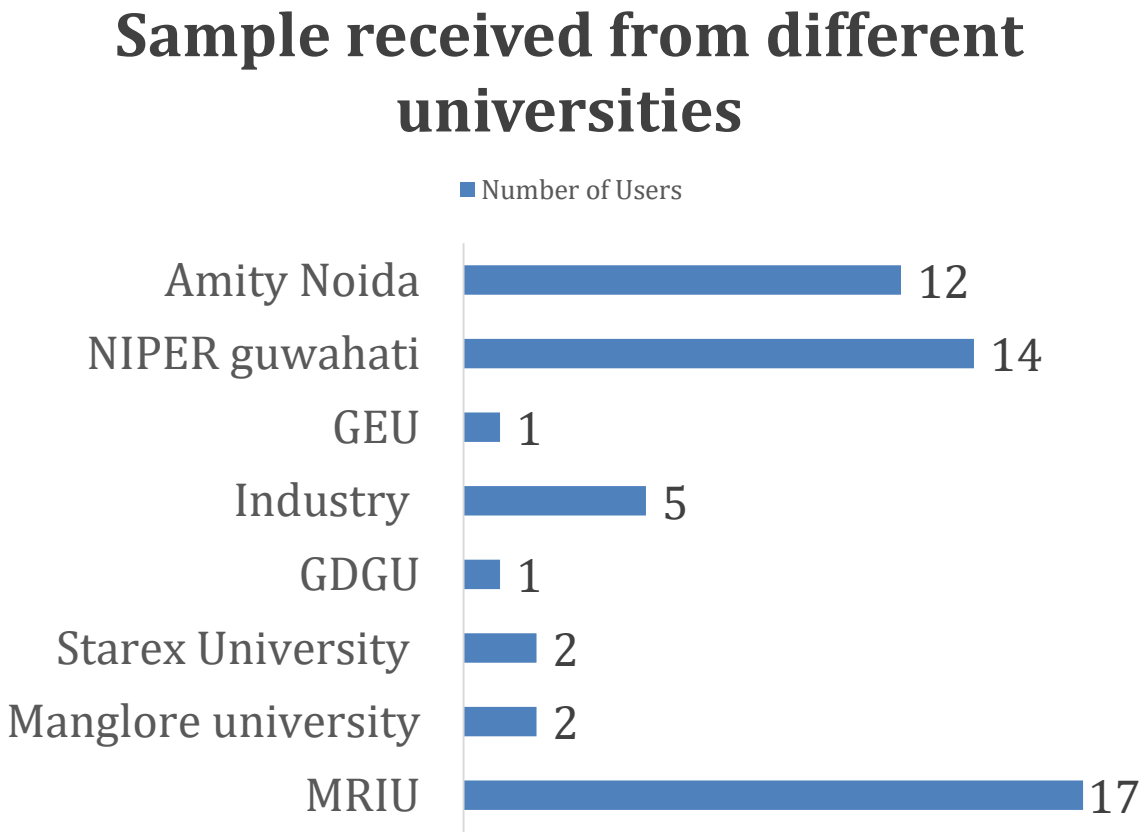


[C] Revenue generated



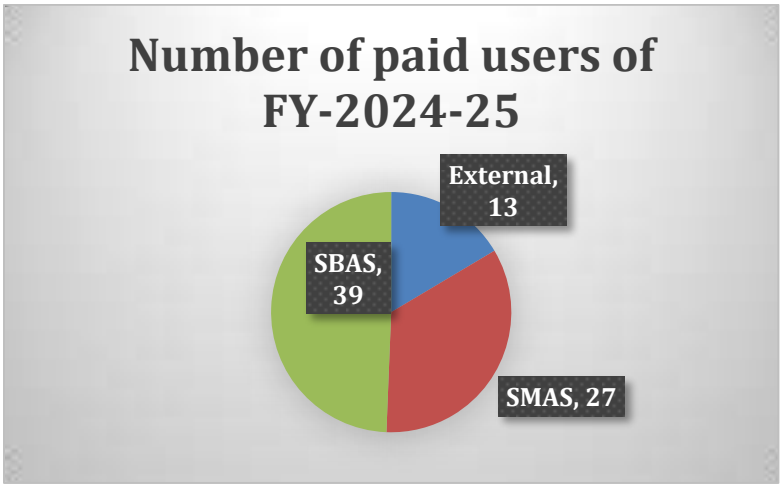
Total= Rs 1,28,850

[D] Data of External user for paid characterizations



[E] Data of user paid for characterizations

FY-2024-25	EXTERNAL	SMAS	SBAS
Number of users	5	13	15



Sr. No.	Payment Date	USER ID	User Name	Internal/External	University Name
1	4/15/2024	I24ApT0001	Pooja Lamba	Internal	KRMU
2	4/16/2024	I24ApU0001	Preeti	Internal	KRMU
3	4/30/2024	I24ApU0002	Preeti	Internal	KRMU
4	05-01-2024	I24MaF0001	Vinay Kumar	Internal	KRMU
5	05-01-2024	I24MaU0003	Vinay Kumar	Internal	KRMU
6	5/13/2024	I24MaD0001	Nishu Kumar Sinha	Internal	KRMU
7	5/13/2024	I24MaU0004	Nishu Kumar Sinha	Internal	KRMU
8	5/13/2024	I24MaF0002	Nishu Kumar Sinha	Internal	KRMU
9	5/16/2024	E24MaT0002	Dr Lalit Ranakoti	External	GEU
10	5/23/2024	I24MaF0003	Akshi Goyal	Internal	KRMU
11	5/27/2024	I24MaF0004	Prachi Chopra	Internal	KRMU
12	5/27/2024	I24MaD0002	Prachi Chopra	Internal	KRMU

13	5/27/2024	I24MaU0005	Prachi Chopra	Internal	KRMU
14	5/30/2024	I24MaU0005	Bhawna Mathur	Internal	KRMU
15	06-03-2024	I24MaF0005	Himani Shukla	Internal	KRMU
16	06-04-2024	I24JuU0006	Preeti	Internal	KRMU
17	06-05-2024	I24JuU0007	Himani Shukla	Internal	KRMU
18	6/13/2024	I24JuU0008	Preeti	Internal	KRMU
19	6/20/2024	I24JuD0003	Akash Sharma	Internal	KRMU
20	6/20/2024	I24JuF0006	Akash Sharma	Internal	KRMU
21	6/20/2024	I24JuU0009	Akash Sharma	Internal	KRMU
22	6/27/2024	I24JuU0010	Preeti	Internal	KRMU
23	6/29/2024	I24JuF0007	Prashant Bansal	Internal	KRMU
24	6/29/2024	I24JuT0003	Pooja Lamba	Internal	KRMU
25	07-01-2024	I24JuU0011	Preeti	Internal	KRMU
26	07-12-2024	I24JuT0004	Dr. Diwakar Padalia	Internal	KRMU
27	7/13/2024	I24JuF0008	Prashant Bansal	Internal	KRMU
28	7/23/2024	I24JuU0012	Prachi Chopra	Internal	KRMU
29	7/23/2024	I24JuD0004	Prachi Chopra	Internal	KRMU
30	7/23/2024	I24JuU0013	Bhawna Mathur	Internal	KRMU
31	7/23/2024	I24JuF0009	Bhawna Mathur	Internal	KRMU
32	08-06-2024	I24AuF0010	Preeti	Internal	KRMU
33	8/21/2024	I24AuF0011	Preeti	Internal	KRMU
34	8/21/2024	I24AuU0014	Preeti	Internal	KRMU

35	8/22/2024	I24AuT0005	Dr Neeraj	Internal	KRMU
36	8/22/2024	I24AUF0012	Dr Neeraj	Internal	KRMU
37	8/23/2024	I24AuU0015	Preeti	Internal	KRMU
38	8/27/2024	E24AuD0005	Nanomatrix Materials Pvt Ltd.	External	INDUSTRY
39	8/27/2024	E24AuT0005	Nanomatrix Materials Pvt Ltd.	External	INDUSTRY
40	09-06-2024	E24SeF0013	Monika	External	GDGU
41	09-12-2024	E24SeD0006	Nanomatrix Materials Pvt Ltd.	External	INDUSTRY
42	9/17/2024	I24SeF0014	Nikhil Gupta	Internal	KRMU
43	9/17/2024	I24SeD0006	Nikhil Gupta	Internal	KRMU
44	9/24/2024	E24SeF0015	Devi	External	Starex University
45	9/24/2024	E24SeT0006	Devi	External	Starex University
46	10-04-2024	I24OcF0016	Chourasiya Raju Balgovind	Internal	KRMU
47	10/23/2024	I24OcF0017	Priya	Internal	KRMU
48	10/23/2024	I24OcU0016	Priya	Internal	KRMU
49	10/26/2024	I24OcU0017	Joginder Singh	Internal	KRMU
50	11-07-2024	E24NoT0007	Shreevani K	External	Manglore University
51	12/22/2024	I24DeF0016	Priya	Internal	KRMU
52	1/14/2025	I25JaF0017	Priya	Internal	KRMU
53	1/14/2025	I25JaF0018	HIMANI SHUKLA	Internal	KRMU
54	1/14/2025	I25JaT0008	HIMANI SHUKLA	Internal	KRMU
55	1/17/202	I25JaF0019	Diwakar	Internal	KRMU

	5		Padalia		
56	1/17/2025	I25JaT0009	Diwakar Padalia	Internal	KRMU
57	1/21/2025	I25JaU0018	Himani Shukla	Internal	KRMU
58	1/21/2025	I25JaT0010	Himani Shukla	Internal	KRMU
59	1/21/2025	I25JaF0020	Dr. Nitish Yadav	Internal	KRMU
60	1/28/2025	I25JaU0019	Priya	Internal	KRMU
61	2/17/2025	I25FeU0020	Kashmira Karayat	Internal	KRMU
62	2/17/2025	I25FeU0021	Deepika Rathi	Internal	KRMU
63	2/24/2025	E25JaT0011	Arpita Roshni Behera	External	AMITY Noida
64	2/24/2025	E25FeL0001	Sandeep Jat	External	NIPER Guwahati
65	03-05-2025	I25MaD0007	Deepika Rathi	Internal	KRMU
66	03-05-2025	I25MaF0021	Deepika Rathi	Internal	KRMU
67	03-05-2025	I25MaD0008	Swati	Internal	KRMU
68	03-05-2025	I25MaF0022	Swati	Internal	KRMU
69	03-05-2025	I25MaD0009	Rohit	Internal	KRMU
70	03-05-2025	I25MaF0023	Rohit	Internal	KRMU
71	03-05-2025	I25MaD0010	Abhishek	Internal	KRMU
72	03-05-2025	I25MaF0024	Abhishek	Internal	KRMU
73	3/17/2025	I25MaU0022	Kashmira Karayat	Internal	KRMU
74	3/21/2025	E25MaT0012	Neha Kaushik	External	MRIU
75	3/21/2025	E25MaT0013	Neha Kaushik	External	MRIU
76	3/21/2025	I25MaF0025	Dr.Nitish yadav	Internal	KRMU

77	3/25/2025	I25MaF0026	Dr.Nitish yadav	Internal	KRMU
78	3/28/2025	I25MaU0023	HIMANI SHUKLA	Internal	KRMU
79	3/29/2025	E25MaT0014	Neha Kaushik	External	MRIU

Appendix C

(List of Publications)

Case Studies in Thermal Engineering 72 (2025) 106357

Contents lists available at ScienceDirect

Case Studies in Thermal Engineering

journal homepage: www.elsevier.com/locate/csite

Thermo-physical properties evaluation of commercially available phase change material and engine oil

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[f] Mechanical Engineering Department, UCL, London, WC1E, United Kingdom

{SCIE & SCOPUS} ***(I.F.-6.4, Q1)***

Co-published by
Institute of Fluid-Flow Machinery
Polish Academy of Sciences
Committee on Thermodynamics and Combustion
Polish Academy of Sciences

ARCHIVES OF THERMODYNAMICS

Numerical Investigation of Increasing-Decreasing Stepped Micro Pin Fin Heat Sink Having Various Arrangements

Prabhakar Bhandari[1], Vineet Sharma[2], Lalit Ranakoti[3], Vijay Singh Bisht[4], Manish Kumar Lila[5], Shivasheesh Kaushik[6]*, Nikhil Kanojia[7], Ayushman Srivastava[7], Bhupendra Kumar[8], Shailesh Ranjan Kumar[9], Manish Kumar[10], Ashwarya Raj Paul[11]

Received: 01.02.2024; revised: 06.04.2024; accepted: 06.06.2024

{ESCI & SCOPUS} ***(I.F.-0.8, Q3)***

J Mater Sci: Mater Electron (2024) 35:1375

Tuning the structural, optical, and dielectric properties of europium-doped barium titanate ceramics

Diwakar Padalia[1], Umesh Kumar[1], Prabhakar Bhandari[2], Jasvir Dalal[3], Lalit Ranakoti[4], and Tej Singh[5,*]

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[3] Department of Physics, Rajdhani College, University of Delhi, Delhi 110015, India
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[5] Faculty of Informatics, Savaria Institute of Technology, ELTE Eötvös Loránd University, Budapest 1117, Hungary

{SCIE & SCOPUS}(I.F.-2.8, Q2)

International Journal on Interactive Design and Manufacturing (IJIDeM)
https://doi.org/10.1007/s12008-024-01972-2

ORIGINAL ARTICLE

Computational analysis of modified solar air heater having combination of ribs and protrusion in S-shaped configuration

Sumit Kumar[1] - Vijay Singh Bisht[1] - Prabhakar Bhandari[2] - Lalit Ranakoti[3] - Akashdeep Negi[3] - Ankur Singh Bist[4] - Diwakar Padalia[5]

Received: 16 April 2024 / Accepted: 22 June 2024

{ESCI & SCOPUS} ***(I.F.-2.1, Q2)***

Appendix D

(Conferences conducted by CEAMR)

Title of the conference: 2nd International Conference on Advanced Materials for Green Chemistry and Sustainable Environment (AMGSE-2025)

Date: March 20-21, 2025, Venue: KRMU, Campus.

Objective of the Conference: The objectives of the 2nd International Conference on Advanced Materials for Green Chemistry and Sustainable Materials is multi-faceted and encompasses several key aims:

- To promote awareness and development of **eco-friendly materials and green technologies**.
- To foster **collaborative research and innovation** among national and international scientific communities.
- To encourage **young researchers and students** to explore sustainable solutions for real-world environmental and industrial challenges.
- To highlight the **role of materials science** in achieving **sustainable development goals (SDGs)**.
- To bridge the gap between **academic research and industrial applications** in green chemistry and sustainable technologies.

Overall, the conference aimed to serve as a catalyst for accelerating the transition towards a more sustainable future by promoting the development and adoption of advanced materials and green chemistry principles across various sectors, ultimately contributing to the preservation of natural resources, reduction of environmental pollution, and enhancement of global well-being.

Themes and Sub-Themes of the Conference

The conference topics include, but are not limited to:

Advanced Materials for Green Chemistry

- Development of eco-friendly and biodegradable materials and their applications
- Sustainable polymers and composites.
- Nanomaterials for green catalytic processes.

- Bio-based and renewable feedstock materials.
- Materials for waste management and resource recovery

Sustainable Environmental Technologies

- Materials for water and air purification systems.
- Innovations in renewable energy materials (solar, wind, bioenergy).
- Carbon capture, utilization, and storage (CCUS) materials.
- Sensors for environmental monitoring.
- Sustainable construction materials.
- Indian Knowledge System for achieving Environmental Sustainability

Green Chemistry Approaches

- Atom economy and waste minimization in chemical processes.
- Green solvents and reaction media.
- Photocatalysis and electrocatalysis for environmental applications.
- Mechanochemistry and alternative energy sources for green synthesis.
- Green technologies for chemical manufacturing.
- Forensic toxicology and environmental forensic

Applications of Advanced Materials in Sustainability

- Advanced materials in sustainable agriculture.
- Energy-efficient materials for buildings and infrastructure.
- Materials for sustainable transportation (e.g., lightweight composites).
- Advanced batteries and energy storage systems.
- Functional materials for environmental sensors and remediation.

Analytics for Sustainable Development through Optimization and Modelling

- Green Logistics and Sustainable Inventory/ production Management
- Multi-Objective Optimization for Sustainable Manufacturing Systems
- Fuzzy and Stochastic Models for Uncertain Demand and Sustainability
- Waste to energy nexus, technology for future industries
- Additive manufacturing IOT and Information and Communications Technology (ICT)
  in Industries

Policy, Education, and Innovation for Sustainable Development

- Role of advanced materials in achieving the UN Sustainable Development Goals (SDGs).
- Strategies for implementing green chemistry in academia and industry.
- Environmental impact and regulatory frameworks for advanced materials.
- Public-private partnerships for innovation in sustainable materials.
- Innovation with Sustainable Development goals for quality education

Inaugural Function

The 2nd International Conference on Advanced Materials for Green Chemistry and Sustainable Materials (AMGSE-2025) was inaugurated with great enthusiasm at K.R. Mangalam University, organized jointly by the School of Basic and Applied Sciences, K.R. Mangalam University, and Shivaji College, University of Delhi, in collaboration with Vijnana Bharti (Haryana) and the International Association of Advanced Materials (IAAM), Sweden. The event is sponsored by the Advanced Natural Research Foundation (ANRF), the Department of Science and Technology (DST), and the Defence Research and Development Organisation (DRDO), Delhi.

The inaugural session began on an auspicious note with the **lighting of the ceremonial lamp** and the soulful recitation of the **Saraswati Vandana**, invoking the blessings of the Goddess of Knowledge.

The session was graced by several eminent dignitaries. **Prof. Raghuvir Singh**, Hon'ble **Vice Chancellor of K.R. Mangalam University**, warmly welcomed the guests and highlighted the university's commitment to promoting research and innovation in green chemistry and sustainable technologies.

Prof. Virender Bhardwaj, Principal, Shivaji College, extended his heartfelt gratitude to the organizing partners and emphasized the importance of such international platforms in bridging research across borders.

The **Chief Guest**, **Prof. Ranjana Aggarwal**, Director, **CSIR-National Institute of Science Communication and Policy Research (NIScPR)**, delivered an inspiring address, emphasizing the need for environmentally sustainable materials and the role of interdisciplinary research in shaping a green future.

The **Guest of Honour**, **Prof. V. K. Aggarwal**, **Pro-Chancellor, Jagannath University**, appreciated the efforts of the organizers and encouraged young researchers to take forward the mission of sustainability through innovation.

Prof. Meena Bhandari, Dean, School of Basic and Applied Sciences, expressed her pride in being part of such a globally significant event and encouraged continued collaboration between institutions.

Dr. Chandra Mohan, Organizing Secretary & Convenor, AMGSE-2025, shared the objectives and themes of the conference, setting the tone for the sessions to follow.

The conference witnessed participation from several distinguished international speakers, including **Prof. Dominic C. Y. Foo** from Malaysia and **Dr. Ahmed Kareem Hussein Alatafi** from Iraq, who graced the event with their in-person presence and delivered brief introductory remarks during the inaugural session.

The inaugural function was a perfect blend of academic excellence and cultural heritage, setting a vibrant tone for the multi-day conference that aims to foster international collaboration and address pressing environmental challenges through advanced materials and green chemistry.

Invited lectures:

As part of the 2nd International Conference on Advanced Materials for Green Chemistry and Sustainable Materials (AMGSE-2025), a series of insightful invited lectures were delivered by renowned experts from India and abroad, enriching the academic discourse with their cutting-edge research and valuable perspectives.

Prof. Sabu Thomas, Former Vice Chancellor and Director, Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam, Kerala, India, delivered a highly engaging lecture on the emerging trends in nanomaterials and their applications in sustainable development. His talk inspired young researchers to explore interdisciplinary approaches in material science.

Prof. (Dr.) Rajendra Sarin, expert in Forensic Chemistry, National Forensic Sciences University, New Delhi, shared insights into the latest advancements in forensic applications of green materials, emphasizing the integration of science and justice.

Dr. Ahmed Kareem Hussein Alatafi, from the College of Science, Diyala University, Iraq, provided an international perspective on innovative research in environmental chemistry, showcasing collaborative efforts for global sustainability.

Dr. Gaurav Khandelwal, from ENTEG, University of Groningen, Netherlands, presented his work on sustainable energy materials and highlighted the role of advanced materials in the transition to cleaner energy systems.

Prof. Harish Kumar, Central University of Haryana, Mahendergarh, discussed the synthesis and characterization of novel green catalysts, underlining their potential industrial and environmental impact.

Dr. Pooja Srivastava, Scientist E, INMAS, DRDO, New Delhi, elaborated on biomedical applications of sustainable materials in defense research, focusing on innovations in drug delivery and biosensing technologies.

The session provided a rich platform for knowledge exchange, fostering collaboration and inspiring future research in the field of green chemistry and sustainable materials.

The poster session was held in the multipurpose hall, 4th floor, Aryabhatt block, where 30 participants from different institutes showcased their research work through posters. The evaluation of these posters was conducted by our esteemed guests, Dr. Ahmed Kareem, Professor Dominic C. Y. Foo, Head, Centre for Green Technologies, University of Nottingham Malaysia, m Hussein Alatafi, College of Science, Diyala University, Iraq, and Prof. Harish Kumar, Central University of Haryana, Mahendergarh.

On the first day of the conference, four parallel sessions of oral presentations were held at various locations: B018, B009, B011, Bhaskracharya block and the Moot Court, Aryabhatt block from 3:00 pm to 5:00 pm.

The four oral presentation sessions encompassed the following themes:

- Green Chemistry Approaches, Biochemistry & Forensic toxicology
- Policy, Education, and Innovation for Sustainable Development
- Advanced Materials for Green Chemistry & Sustainable Agriculture
- Indian Knowledge System for achieving Environmental Sustainability

The session in Moot court, Aryabhatt block was chaired by Dr. Jyoti Sinha, Principal & Associate Dean, Pharmacy, Sushant University, Gurugram and Co-Chaired by Dr. Anoop Yadav, Associate Professor, Dept. of Environmental Studies, Central University of Haryana. The moderators for this session were Dr. Divyanshi from K. R. Mangalam University and Dr. Reeta from Shivaji college.

In B018, Dr. Anu Singh, ICMR-Scientist, School of Biotechnology, Jawaharlal Nehru University, New Delhi was the session chair and Dr. Chhagan Lal, Assistant Professor, Department of Chemistry - Swami Shraddhanand College, Delhi was the session-co-chair. The session was moderated by Dr. Mohabbat Ali from K.R. Mangalam University and Mr. Deepesh from Shivaji college.

Dr. Vishal Baloria, Assistant Professor, School of Engineering & Technology, BML Munjal University with co-chair Dr. Vinod Kumar, Associate Professor, School of Healthcare and Allied Sciences, G. D. Goenka University, Gurugram evaluated the session in B011, Bhaskracharya block along with Dr. Prabhakar Bhandari and Dr. Nidhi, moderators for this session.

Dr. Anil Kumar, Associate Professor, Department of Applied Sciences, Bharati Vidyapeeth College of Engineering, Delhi shared the session under the theme '• Policy, Education, and Innovation for Sustainable Development'. The moderators for this session were Dr. Pratibha Sharma and Dr. Pawan

Prior to the commencement of the technical sessions at the 2nd International Conference on Advanced Materials for Green Chemistry and Sustainable Materials (AMGSE-2025), a series of impactful keynote lectures were delivered by eminent international scientists, setting a strong academic foundation for the sessions that followed.

Dr. Avtar Singh, Research Scientist, Research and Development, Molekule Inc., USA, delivered an engaging talk focused on air purification technologies and the role of nanomaterials in environmental remediation. His insights into industry-driven innovations aligned seamlessly with the conference's theme of sustainable materials and green technologies.

Dr. Sonia A. C. Carabineiro, from Nova University of Lisbon, Portugal, shared her expertise on catalysis and green chemistry, highlighting the significance of sustainable catalytic processes in achieving energy-efficient and eco-friendly chemical transformations.

Following these, a keynote lecture by Dr. Ajeet Kaushik, Florida Polytechnic University, USA, held from 16:00 to 16:20, emphasized nano-enabled sensing platforms for environmental and biomedical applications. His lecture provided a futuristic view of how nanotechnology can be leveraged for real-time monitoring and sustainable health solutions.

These keynote addresses offered valuable perspectives from academia and industry, stimulating thought-provoking discussions and encouraging collaborative research for addressing global sustainability challenges.

As part of the 2nd International Conference on Advanced Materials for Green Chemistry and Sustainable Materials (AMGSE-2025), a total of 25 participants from diverse colleges and universities actively contributed to the oral presentation sessions. These sessions served as a vibrant platform for scholars and researchers to share their innovative research findings, technological advancements, and practical applications aimed at promoting green chemistry and sustainable development.

Presentations covered a wide range of contemporary themes, including:

- **Green Chemistry Approaches, Biochemistry & Forensic Toxicology**: Participants highlighted green synthesis methods, environmentally-friendly biochemical processes, and novel forensic toxicology tools contributing to safer scientific practices.
- **Policy, Education, and Innovation for Sustainable Development**: Speakers explored the impact of educational reforms, policy frameworks, and grassroots innovations essential for achieving long-term sustainability goals.
- **Advanced Materials for Green Chemistry & Sustainable Agriculture**: Discussions focused on the development and application of smart materials, biodegradable polymers, and eco-friendly agro-technologies to support sustainable farming practices.
- **Indian Knowledge System for Achieving Environmental Sustainability**: Several presentations reflected on traditional Indian ecological wisdom, integrating ancient knowledge with modern scientific advancements to address today's environmental challenges.

Throughout the sessions, the role of advanced materials in mitigating environmental pollution, incorporating green chemistry principles in industrial systems, and promoting circular economy models were key discussion points.

To recognize the significant contribution of session moderators, all session chairs and co-chairs were presented with mementos and certificates by faculty members of K.R. Mangalam University, acknowledging their time, insights, and efforts in evaluating the presentations.

These sessions not only fostered academic exchange but also inspired collaborative thinking for a greener, more sustainable future.

2ND DAY OF THE CONFERENCE

The academic proceedings of the 2nd International Conference on Advanced Materials for Green Chemistry and Sustainable Materials (AMGSE-2025) began with a powerful lineup of keynote and invited lectures delivered by eminent national and international experts in the field of sustainable science and green technologies.

The session commenced with an invited lecture by Prof. Dominic C. Y. Foo, Head of the Centre for Green Technologies, University of Nottingham, Malaysia, who provided deep insights into the integration of process systems engineering with green technologies to achieve sustainable industrial practices.

The next keynote lecture was delivered by Dr. Sandeep Kumar Lal, ICAR-IARI, New Delhi, who shared advancements in sustainable agricultural systems, bioresource utilization, and green innovation strategies in farming.

Dr. Jaspal Singh, Post-Doctoral Fellow at the University of Quebec, Canada, delivered a keynote lecture focusing on nanomaterial development and their applications in environmental remediation, energy storage, and biomedical sciences.

The session continued with an invited lecture by Prof. Ponnadurai Ramasami from the University of Mauritius, who discussed quantum chemical approaches and computational methods in green material design.

Dr. Suman Singh, Senior Principal Scientist and Head at CSIR-CSIO, Chandigarh, gave an impactful keynote address on the development of scientific instruments and technologies with a green and sustainable focus, aiding both research and industrial sectors.

Concluding the pre-session lectures, Dr. Yogendra Kumar Mishra, from the University of Southern Denmark, presented an engaging keynote lecture on functional nanostructures and their pivotal roles in environmental protection, sustainable energy solutions, and next-generation material applications.

This lecture series laid a strong foundation for the conference, stimulating intellectual curiosity and setting the tone for the subsequent technical sessions.

Following the impactful invited and keynote lectures, the poster presentation session was conducted as part of the ongoing academic activities at the 2nd International Conference on Advanced Materials for Green Chemistry and Sustainable Materials (AMGSE-2025). The session provided a dynamic platform for interactive knowledge sharing and visual communication of research innovations.

More than 25 participants from various academic institutions enthusiastically presented their research work, showcasing experimental findings, novel concepts, and practical applications aligned with the themes of green chemistry, sustainable development, and advanced materials.

The posters reflected a wide range of interdisciplinary topics, and participants engaged in thoughtful discussions with peers and evaluators. The session fostered networking and idea exchange among budding researchers and seasoned experts.

The posters were evaluated by a panel of esteemed experts, including:

- Dr. Jaspal Singh, Postdoctoral Fellow, University of Quebec, Canada
- Dr. Ahmed Kareem Hussein Alatafi, College of Science, Diyala University, Iraq
- Dr. Suman Singh, Senior Principal Scientist & Head, CSIR-CSIO, Chandigarh

The evaluators appreciated the quality of research and provided constructive feedback to the participants. Select outstanding posters were shortlisted for special recognition, encouraging young researchers to further pursue excellence in their academic pursuits.

The poster session was a vibrant and engaging component of the conference, promoting dialogue, critical thinking, and collaborative spirit among the scientific community.

After the poster session, 3 parallel sessions of oral presentations and one online session were held at various locations. The theme of the sessions were

- Sustainable Environmental Technologies
- Innovation of Advanced Materials with Sustainable Development goals for quality Education
- Analytics for Sustainable development through Optimization and Modelling

The session in moot court was chaired by Dr. Chandra Mouli Pandey, Assistant Professor Chemistry & Deputy Dean Research, SGT University, Gurugram. The moderators of the session were Dr. Divyanshi from K R Mangalam University and Dr. Reeta from Shivaji college.

In B018, Bhaskracharya block, the sessions were held under the theme Innovation of Advanced Materials with Sustainable Development goals for quality Education. The session was chaired by Dr. Vinod Kumar, Deputy COE & Assistant Professor, J. C. Bose University of Science & Technology, YMCA Faridabad and moderated by Dr. Pratibha Sharma from K R Mangalam University and Dr. Seema Lal from Shivaji college.

The session was chaired by Prof. Shamik Tiwari, Dean School of Engineering and Technology, IILM University Gurugram in B009, Bhaskracharya block, under the theme Analytics for Sustainable development through Optimization and Modelling. The moderators of the session were Dr. Mohabbat Ali from K R Mangalam University and Ms. Tamanna from Shivaji college.

An online session was also conducted for the participants and evaluated by Dr. Prabhakar Bhandari, Assistant Professor, School of Engineering and Technology, K R Mangalam University and Ms. Neetu, Assistant Professor, Department of Chemistry, Shivaji collage, University of Delhi.

A dedicated session during AMGSE-2025 focused on the themes of Sustainable Environmental Technologies, Innovation of Advanced Materials aligned with Sustainable Development Goals (SDGs) for Quality Education, and Analytics for Sustainable Development through Optimization and Modelling. Participants shared insightful

presentations and case studies highlighting how innovative materials and technologies can address environmental challenges while supporting global sustainability targets. Emphasis was placed on integrating advanced analytics and modeling techniques to optimize processes for resource efficiency and cleaner production. The session also included online participation, enabling global academic engagement and knowledge exchange. Participants collectively reinforced the importance of interdisciplinary collaboration and education in driving sustainable innovation forward.

VALEDICTORY CEREMONY

The 2nd International Conference on Advanced Materials for Green Chemistry and Sustainable Materials (AMGSE-2025) concluded with a meaningful and engaging valedictory session, marking the successful end of two days of academic enrichment and global collaboration. The session was led by Dr. Ahmed Kareem Hussein Alatafi (Iraq), who delivered a comprehensive summary of the key discussions, research contributions, and collaborative outcomes of the conference.

Prof. Meena Bhandari, the Organizing Head, and Prof. Mehraj Uddin Mir, Motilal Chair, K.R. Mangalam University, addressed the gathering, commending the enthusiasm of participants and the excellence of the sessions conducted. The event also featured a formal award distribution ceremony, recognizing exceptional contributions. Awards were presented for Best Oral

Presentation, Best Poster Presentation, and the prestigious Young Scientist Award, honoring promising researchers in the field.

The session also included reflections from participants, who appreciated the platform for its diverse and high-quality academic exchange. Dr. Chandra Mohan and Dr. Neeraj Kumari, Convenors of AMGSE-2025, extended heartfelt acknowledgments to all dignitaries, speakers, participants, sponsors, and organizing team members for their support and active participation.

The valedictory session concluded on a high note, celebrating the conference's role as a vibrant hub for international collaboration, scientific dialogue, and advancement of sustainable practices in green chemistry and environmental sciences.

Best oral/poster presentation awards

The jury of the session chair and co-chair have selected overall four best oral presentation, and four poster presentation awards based on relevance of their work to the conference theme.

S N	Title of talk	Presenter	Affiliation	Award
01	Biphenyl based photo luminescent sensor for real time hydrazine detection: Design, synthesis, DFT and single crystal XRD studies	Ms. Dinkal V. Kasundra	Tarsadia Institute of Chemical Science (TICS), Uka Tarsadia University, Bardoli – 394 350, Gujarat, India	Oral Presentation
02	Next-Generation Recycling for Photovoltaics: APOLLO's Strategic Approach	Deepa Oberoi	PDRA, Centre for Sustainable Materials Processing, University of Leicester	Oral Presentation
03	Photodegradation of Dyes Using Metal Oxides: A Sustainable Approach for Environmental Remediation	Ms. Bhawna Arora	SBAS, K R Mangalam University	Poster Presentation
04	Role of RF Energy and Cu Material Based RF Sensor Passive Antenna for Biomedical Applications	Abhishek Kumar Saroj	Department of Electronics Engineering, IIT-(BHU) Varanasi, UP, 221005, India	Oral Presentation

05	Sustainable graphene oxide intercalated bentonite composite for the effective removal of imidacloprid from water: Adsorption performance, isotherm and kinetics	Priyanka Negi	Department of Chemistry, Graphic Era (Deemed to be) University, Dehradun-248002	Poster Presentation

Photo 1: Participants and guests during inauguration session

Photo 2: Lamp lighting ceremony during inauguration session

Photo 3: Conference delegates and convenors during release of abstract book

Photo 4: Dr Meena Bhandari welcomed all the guests

Photo 5: Prof. Mehraj Uddin Mir presented token of gratitude to Prof. V K Agarwal

Photo 6: Dr Divyanshi during the technical session

Photo 7: participants during poster presentation

Photo 8: Dr. Pooja during her talk

Photo 9: Dr. Jaspal during his talk

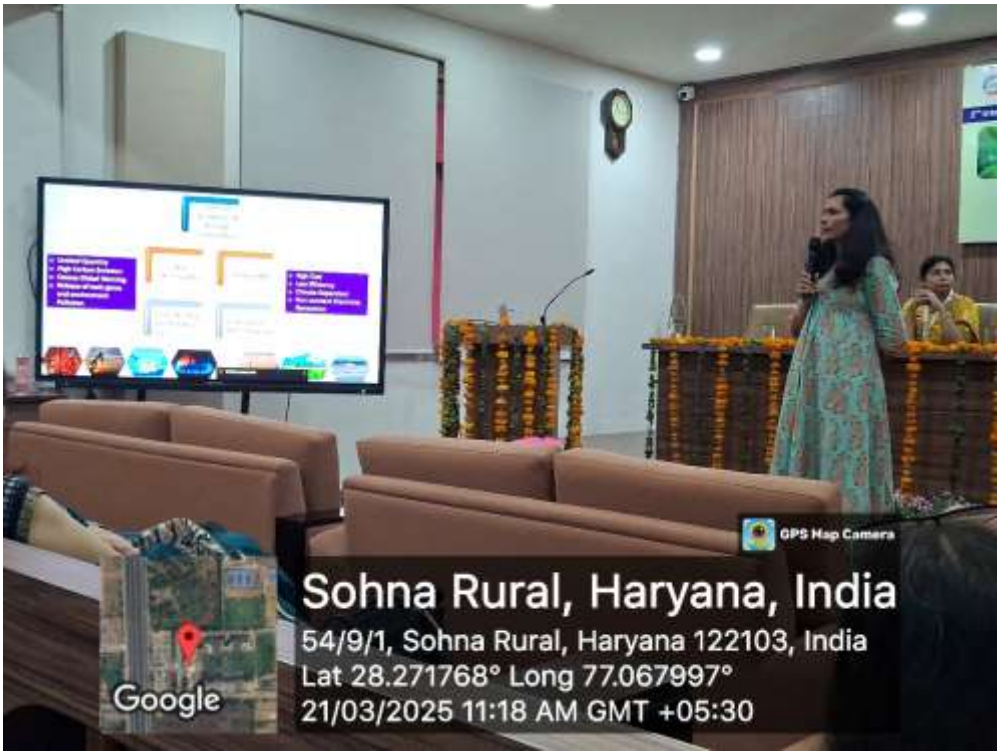

Photo 10: Dr. Suman during her talk

Photo 11: Prof. Dominic during the evaluation of the poster of participants

Photo 12: Dr Neeraj Kumari gave vote of thanks in the conference

Photo 13: Conference chair and convenor with guests awarded the participants for best oral presentation