

A Century of Service to the Nation

Volume 10 | Issue 1 | January 2025

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# Notification for IEI R&D Grant-in-Aid

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To promote appropriate technology, assist in building up design & research talents and, most importantly, to help in nurturing potential R&D venture amongst engineering students pursuing Diploma/UG/PG/PhD courses. The Institution of Engineers (India) had instituted the R&D Grant-in-Aid program way back in 2001.

Every year, the Institution invites applications for funding industry-oriented R&D projects and research initiatives aimed at improving the life-style of common people from engineering students pursuing full time Diploma/UG/PG/PhD engineering program in AICTE/UGC/NAAC approved Institutions / Colleges / Universities. The application form and guidelines are available in our website <https://www.ieindia.org>. The projects should be carried out under the guidance of faculty members who are Corporate Members of IEI. Membership criteria for student(s), guide(s) and institution(s) are as follows:

Project Category	Student/Applicant Membership	Guide(s) Membership	Institutional Membership
1. Diploma	Exempted [Membership of Student Chapter is desirable]	AMIE/MIE/FIE	Not Mandatory
2. UG (BE/BTech/ Equivalent)	'Student Member' (SMIE)	AMIE/MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank
3. PG (ME/MTech/ Equivalent)	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank
4. PhD	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank

The soft copy of the duly filled-up applications (in editable format), as per the proforma available on our website [www.ieindia.org](http://www.ieindia.org), should be sent through email to [research@ieindia.org](mailto:research@ieindia.org) and one printed copy of the same should reach the following address:

**The Deputy Director (Technical)**

The Institution of Engineers (India)  
8 Gokhale Road, Kolkata 700 020

Kindly go through the guidelines (visit link: <https://www.ieindia.org/webui/IEI-Activities.aspx#RnD-Initiative>) before filling up the application.

# Members in the News

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**Dr V Narayanan, FIE**

Chairman  
Indian Space Research Organisation (ISRO)

It is matter of pride for The Institution of Engineers (India) to note that Dr V Narayanan, a noted rocket and spacecraft propulsion expert and alumni of The Institution of Engineers (India) who completed his AMIE course in Mechanical Engineering from The Institution of Engineers (India) has been appointed as the **Chairman of Indian Space Research Organisation** at a time when India's space sector is in reform-mode and the national space agency has major projects lined up including the Gaganyaan human spaceflight, the Chandrayaan-4 mission and the development of the country's own space station. He assumed charge as Secretary, Department of Space and Chairman, Space Commission on the afternoon of 13 January 2025,.

Dr V Narayanan, M. Tech in Cryogenic Engineering and Ph.D. in Aerospace Engineering from IIT Kharagpur, is instrumental in designing the engine system for GSLV Mk-II vehicle, and developing the necessary software tools, contributing for establishing the necessary infrastructure / test facilities, testing and qualification and completing the development of Cryogenic Upper Stage (CUS) and making it operational.

The L110 Liquid Stage and C25 Cryogenic Stage for the LVM3 and throttleable propulsion system of the Vikram lander used for soft landing near the south pole of the moon vehicle for Chandrayaan-3 missions was developed and delivered under his leadership. He was the Chairman of the National Level Expert Committee which pinpointed the reasons for Chandrayaan-2 hard landing and recommended necessary improvements which eventually contributed to the success of Chandrayaan-3 and made India as the first country to soft-land near south-pole of Moon.

## Professional Career

As Director, of Liquid Propulsion Systems Centre (LPSC), one of the major Centres of the Indian Space Research Organisation (ISRO), he provided techno-managerial leadership to LPSC, which is engaged in the development of Liquid, Semi-Cryogenic and Cryogenic Propulsion Stages for Launch Vehicles, Chemical and Electric Propulsion Systems for Satellites, Control Systems for Launch Vehicles and Transducer development for propulsion system health monitoring.

ISRO Propulsion Complex (IPRC) located at Mahendragiri (Tamil Nadu) is a unit of ISRO responsible for assembly, integration and testing of Liquid Propulsion systems. As Chairman of LPSC-ISRO Propulsion Complex (IPRC) Coordination Committee, he was responsible for reviewing and executing the activities involving assembly, integration and testing of Liquid Propulsion systems.

Dr V Narayanan as the Chairman of Project Management Council-Space Transportation System (PMC-STs), the decision making body in all Launch Vehicle projects & programmes, guided the operational and development activities of launch vehicle of ISRO. He was also the Chairman of the National Level Human Rated Certification Board (HRCB) of Gaganyaan programme.

## Honors and Awards

Dr Narayanan has been honored with several prestigious awards. Notable among them are National Design Award from NDRF, The Institution of Engineers (India), Gold Medal from the Astronautical Society of India (ASI), ASI Award for Rocket and Related Technologies, Team Award from High Energy Materials Society of India (HEMSI), Performance Excellence Award and Team Excellence Award of ISRO, and National Aeronautical prize from Aeronautical Society of India, Honorary Degree of Doctor of Science (Honoris Causa) from Sathyabama University, Chennai, Distinguished Alumnus Award-2018 by IIT Kharagpur, APJ Abdul Kalam Award 2023, Tamil Nadu Chief Minister's award for Chandrayaan-3, Life Fellowship Award of IIT Kharagpur in 2023 and awarded 2024 Laurels for Team Achievement for Chandrayaan-3 by International Academy of Astronautics.

# Members in the News

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**Dr Ashutosh Sharma, FIE**  
Institute Chair Professor &  
INAE Visvesvarya Chair Professor &  
Coordinator, DST Unit on Nanoscience &  
Center for Environmental Science and Engineering

The Institution of Engineers (India) congratulates Dr Ashutosh Sharma, Distinguished Chair Professor at IIT Kanpur and honorable Fellow Member of The Institution of Engineers (India), for being honoured with **Padma Shri** for Contributions to Science and Public Service as announced on 76th Republic Day, 26 January 2025.

A pioneer in nanotechnology and interdisciplinary research, Sharma's contributions span academia, innovation, and public service in connection with infrastructure and human capacity building; innovation and startups; R&D in advanced manufacturing, waste processing, clean energy and cyber-physical systems; industry-academia cooperation; science communication; women scientists; and major international collaborations in the areas of priority for the nation. During the COVID-19 pandemic, Dr Sharma played a crucial role in launching impactful startup products aimed at patient care.

Dr Sharma has been a Professor and an Institute Chair Professor and the Head (2003-05) of Chemical Engineering, and the founding Coordinator of Nanosciences Center and Advanced Imaging Center at the Indian Institute of Technology at Kanpur. He was a Research Scientist, Department of Ophthalmology, School of Medicine and Biomedical Sciences, State University of New York at Buffalo, 1987-1990. He received his PhD from the State University of New York at Buffalo (SUNYAB, 1988), his MS from the Pennsylvania State University (1984) and B.Tech. from IIT Kanpur (1982).

## Professional Career

He was a member of the editorial board of Chemical Engineering Science from 2007 to 2010. Prior to it, he served on the editorial board of the Journal of Colloid and Interface Science (2000-2002) and Canadian Journal of Chemical Engineering (2006-2008). Then, from 2011 to 2013, he was in the editorial board of Nanomaterials and Energy journal. From 2012 to 2014, he served as an associate editor of the Journal of Micro- and Nano-Manufacturing. From 2013 to date, he has been serving as an associate editor of ACS Applied Materials & Interfaces journal.

He was appointed as the Secretary, Department of Science and Technology, Government of India on 9 January 2015 and served there till 31 August 2021. He also served as President of Indian National Science Academy from 2023 till 2025.

## Honors and Awards

He has received several awards such as the Shanti Swarup Bhatnagar award in engineering sciences for his original pioneering contribution to the understanding of the behaviour of thin films and other highly confined nanoscale systems, Herdillia Award by the Indian Institute of Chemical Engineers and Distinguished Alumnus Award from the Indian Institute of Technology Kanpur, to name a few.

He is an elected fellow of prestigious societies such as the Academy of Sciences for the Developing World, Indian National Science Academy, Indian National Academy of Engineering, Indian Academy of Sciences and the National Academy of Sciences, India, in addition to being a Fellow Member of The Institution of Engineers (India).

# Members in the News

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## **Dr Gaurab Kumar Ghosh**, AMIE

Assistant Professor

Department of Mechanical Engineering, Indira Gandhi Institute of Technology, Sarang, Dhenkanal, Odisha

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**Dr Gaurab Kumar Ghosh** was conferred the Degree of Doctor of Philosophy on the Research Title “Experimental & Mathematical Analysis of Gear Oil Based Nanolubricants” by Indian Institute of Technology (Indian School of Mines), Dhanbad during 44th Convocation at Indian Institute of Technology (ISM) Dhanbad on 25 September 2024.

The following esteemed corporate members were conferred with the prestigious **Professional Engineers (PE) Certificate** from IEI after successful completion of the assessment process and they have been authorised to use the style and title of **P Eng (I)** by virtue of expertise in their field:



## **Er Ramalingam Amaravel**, FIE & PE7007383 (Certified Professional Engineer, IEI)

CEO, International Infrastructure Technology Specialists, Bangalore, Karnataka

Field : Civil Engineering

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Valid from: 14 January 2025

Valid up to: 31 January 2030

## ANNOUNCEMENT

### **Know-Your-Member (KYM)**

**Is your mobile number & e-mail updated with us ? If not, then please forward your Know-Your-Member (KYM) form immediately for participating in IEI Election process.**

You are requested to forward your KYM along with the self-attested copy of photo ID proof to the address given below:-

#### **Deputy Director (Membership)**

The Institution of Engineers (India)

8 Gokhale Road, Kolkata 700020

Email: [datamemb@ieindia.org](mailto:datamemb@ieindia.org)

The form is available on IEI Website or scan the code:

[https://www.ieindia.org/WebUI/ajax/Downloads/WebUI\\_PDF/HIGHLIGHTS\\_DOCUMENT-3332.pdf](https://www.ieindia.org/WebUI/ajax/Downloads/WebUI_PDF/HIGHLIGHTS_DOCUMENT-3332.pdf)



# Members in the News

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**Er Shubham Prakash Rangrej**, MIE & PE7007391 (Certified Professional Engineer, IEI)

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Valid from: 14 January 2025

Valid up to: 31 January 2030



**Er Ashutosh Mishra**, MIE & PE7007405 (Certified Professional Engineer, IEI)

Senior Construction Engineer, Bechtel Corporation, Neom, Saudi Arabi

Field : Civil Engineering

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Valid from: 14 January 2025

Valid up to: 31 January 2030



**Er Saravanan N**, MIE & PE7007413 (Certified Professional Engineer, IEI)

Resident-cum-Highway Engineer and Acting Team Leader, Theme Engineering Service Pvt. Ltd., Madurai, Tamil Nadu

Field : Civil Engineering

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Valid from: 14 January 2025

Valid up to: 31 January 2030



**Er Akhilesh Anil More**, AMIE & PE7007421 (Certified Professional Engineer, IEI)

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Field : Civil Engineering

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Valid from: 14 January 2025

Valid up to: 31 January 2030

contd.....

## Corporate Air Ticketing for IEI Members

Corporate Members may book Corporate Air Ticket through M/s EBIX Travels Private Ltd. For details please visit

<https://www.ieindia.org/webui/IEI-AirTickets.html>

# Members in the News

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**Er Koushik Das Podder**, MIE & PE7007435 (Certified Professional Engineer, IEI)  
Senior Project Manager, Fitwell Engicon Pvt. Ltd., Meghalaya, Assam  
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Valid from: 14 January 2025  
Valid up to: 31 January 2030



**Er Lokeshkumar Bastimal Soni**, MIE & PE7007448 (Certified Professional Engineer, IEI)  
Principal, Civil Structural Engineering, Wood, Doha, Qatar  
Field : Civil Engineering  
✉ [lokeshsoni60@yahoo.co.in](mailto:lokeshsoni60@yahoo.co.in)  
Valid from: 14 January 2025  
Valid up to: 31 January 2030



**Er Krishna Reddy Meruva**, FIE & PE7007456 (Certified Professional Engineer, IEI)  
Chief Engineer, Panchayat Raj Engineering Department, Government of Andhra Pradesh  
Field : Civil Engineering  
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Valid from: 14 January 2025  
Valid up to: 31 January 2030

## ANNOUNCEMENT

Elevate your status as a Certified Professional Engineers (PE) and International Professional Engineers (IntPE)

### Professional Engineers (PE) Certification by IEI

#### Eligibility Requirement

To attain the Professional Engineers (PE) certification through The Institution of Engineers (IEI), you must meet the following eligibility criteria:

1. Hold a BE/BTech or equivalent degree recognized by a Statutory Authority or the Government of India.
2. Have accumulated five years or more of professional experience.
3. Be a member of a recognized professional engineering institution or association.
4. Maintain a satisfactory level of Continued Professional Development (CPD).

Please visit the following link :

[https://www.ieindia.org/webui/IEI\\_PE\\_Certification.aspx](https://www.ieindia.org/webui/IEI_PE_Certification.aspx)

### International Professional Engineers (IntPE) Certification by IEI

#### Eligibility Requirement

To be eligible for IntPE Certification by IEI, candidates must meet the following criteria:

1. Hold a BE/BTech or equivalent degree recognized by the Statutory Authority or the Government of India.
2. Possess seven years or more of professional experience.
3. Have a minimum of two years of professional experience in a significant engineering activity.
4. Be a member of a recognized professional engineering institution or association.
5. Maintain a satisfactory level of Continued Professional Development (CPD).

Please visit the following link:

[https://www.ieindia.org/webui/IEI\\_IntPE\\_Certification.aspx](https://www.ieindia.org/webui/IEI_IntPE_Certification.aspx)

The eligible candidate can submit application in the prescribed format to: The Deputy Director (Technical), The Institution of Engineers (India), 8 Gokhale Road, Kolkata 700020;  
For any query and assistance, please send email to: [pe@ieindia.org](mailto:pe@ieindia.org)

# Publication by Members

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**Dr Srinivasa Rao Pundru, FIE**

Assistant Professor

Department of Mechanical Engineering, Mahatma Gandhi Institute of Technology (MGIT),  
Hyderabad, Telangana

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**Title of Paper: Synthesis of Multi-Position 3-PRS Manipulator based on Spherical Constraints by Eliminating the PARA**

Peers Alley Media, Scientific Program, Nano Intellects 2024 & Adv. Physics 2024, 20 September 2024, pp 153

URL: <https://peersalley.s3.amazonaws.com/assets/conference-book/adv-physics-2024-215-136.pdf>

**Abstract:** This work presents synthesis of 3-PRS manipulator based on spherical constraints by eliminating the PARA. The PARA can occur due to constrained mobility of the manipulator. The 3-constrained variables of manipulators are rotational freedom along z-axis and 2-translational freedom about x and y-axis of the fixed reference frame. The PARA motions are usually nonzero and are determined by the geometrical parameters of the manipulator. These PARA motions cause crucial problems in some cases. In general the amplitude of PARA motions are very small, but shows more impact on precision of motion, quality and accuracy of the mirror images of 3-PRS manipulator. To prevent these undesirable PARA motions, the synthesized architectural parameters of 3-PRS manipulator are identified by eliminating the PARA motions. The prospective application of this manipulator is in mirror image telescopic process used for alignment applications where tip, tilt and image focus of primary and secondary mirrors and positions are important.

**Keywords:** PARA; Multi-position; Spherical Constraints; 3-PRS; Synthesis



**Er S Valai Ganesh, MIE**

Assistant Professor (Senior Grade)

Department of Mechanical Engineering, Ramco Institute of Technology, Rajapalayam, Tamil  
Nadu

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**Title of Paper: Innovative Solid Waste Management Strategies for Smart Cities in Tamilnadu: Challenges, Technological Solutions, and Sustainable Prospects**

Discover Applied Sciences, Springer, 6, 03 December 2024, pp 1547-1556, Electronic ISSN: 3004-9261

DOI: <https://doi.org/10.1007/s42452-024-06404-0>

**Co-authors:** V. Suresh, S. Godwin Barnabas & S. Rajakarunakaran

**Abstract:** This study focuses on the challenges, technological solutions, and sustainability prospects of solid waste management practices in eleven smart cities in Tamil Nadu, India, through a case study. It was through a systematic review and stakeholder interviews that we assessed the current waste management infrastructure, collection, and processing capabilities in these cities. The analysis concluded that measures for waste segregation remain poor, with collection efficiencies ranging between 80 and 100% and segregation rates across the sampled cities from below 50% to 100% for varying cities. Constraints also include poor infrastructure, lack of public awareness, and financial problems. We develop an integrated waste management framework that advocates source segregation, localized processing, and waste-to-energy plans. The study has shown that the efficient use of smart technologies, the development of public-private alliances, and the principles of the circular economy would significantly enhance the effectiveness of waste management practices in the smart cities of Tamil Nadu. Policy makers and urban planners focused on ameliorating municipal solid waste management systems in fast-growing urban areas can benefit from these findings.

**Keywords:** Solid Waste Management; Smart Cities; Urban Areas; Sustainability; Circular Economy

# Publication by Members

Volume 10 | Issue 1 | January 2025



**Er Chirag Prakashchandra Mistry, MIE**

Senior Scientist

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**Title of Paper: Thermo-Mechanical Analysis on Reflection Characteristics of Deformed Coupling System of a Helix Traveling Wave Tube**

Journal of Electromagnetic Waves and Applications, Taylor & Francis, 39(1), 2025, pp 56-63, Print ISSN: 0920-5071, Online ISSN: 1569-3937


DOI: <https://doi.org/10.1080/09205071.2024.2432923>

**Co-authors:** Raktim Guha & Sanjay Kumar Ghosh


**Abstract:** This paper proposes a fast ANSYS Multiphysics-based system coupling approach to study the impact of structural deformation on the reflection coefficient (S11) of the helix travelling wave tube (TWT) output coupling system at varying output powers. The system, comprising a coaxial stepped impedance transformer, a coaxial-to-rectangular waveguide with a doorknob transition, and a double-mitered bend waveguide, is analysed under 200 W and 250 W RF power in the X-band. The analysis shows that S11 improves at lower frequencies (−17.43 dB to −17.58 dB) and deteriorates at higher frequencies (−10.62 dB to −10.53 dB) due to structural deformation. Thermal simulation results were validated experimentally using infrared thermographic imaging.







**Keywords:** Coaxial-to-Waveguide Transition; Travelling-Wave Tube; S-Parameter; Coupled Multi-Physics Analysis; ANSYS, Thermal Imaging

## ANNOUNCEMENT



### IEI-Springer Journals



					 
ISSN Print 2250-2149 ISSN Electronic 2250-2157	ISSN Print 2250-2106 ISSN Electronic 2250-2114	ISSN Print 2250-0545 ISSN Electronic 2250-0553	ISSN Print 2250-2122 ISSN Electronic 2250-2130	ISSN Print 2250-2483 ISSN Electronic 2250-2491	
<b>Series A</b> CiteScore 2023 2.2 Google Scholar: h5 Index 2022 22	<b>Series B</b> CiteScore 2023 3.1 Google Scholar: h5 Index 2022 24	<b>Series C</b> CiteScore 2023 2.4 Google Scholar: h5 Index 2022 24	<b>Series D</b> CiteScore 2023 2.0 Google Scholar: h5 Index 2022 19	<b>Series E</b> CiteScore 2023 2.0 Google Scholar: h5 Index 2022 11	

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# Publication by Members

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**Prof Gaurab Kumar Ghosh, AMIE**

Assistant Professor (Mechanical Engineering)

Indira Gandhi Institute of Technology (Government of Odisha), Sarang, Dhenkanal, Odisha

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## **Title of Paper: Multi-response Optimization of Tribological Characteristics for Graphene-Gear Oil Nanolubricants Using Grey-Taguchi Methodology Followed by Scrutinization of Lubrication Mechanisms**

Journal of Materials Engineering and Performance, Springer, 18 November 2024, Online ISSN: 1544-1024, Print ISSN: 1059-9495

DOI: <https://doi.org/10.1007/s11665-024-10365-1>

**Co-authors:** Ankit Kotia, Niranjana Kumar & Subrata Kumar Ghosh

**Abstract:** This study investigates the tribological performance and explores the lubrication mechanisms exhibited by graphene nanoparticles (GnPs) as nano-additives in gear oil (SAE EP-90) for heavy-duty applications. Nanolubricant (NL) samples were prepared with predefined volume fraction of the nanoparticles. Tribological properties of the NL were obtained using a pin-on-disc tribometer. The tribological experiments were carried out by grey-Taguchi orthogonal array. NL showed appreciable dispersion stability and oxidation stability. Prepared NL samples yielded a maximum reduction of 54.12% in pin wear, 18.46% in frictional force and 31.76% in wear scar diameter compared to plain gear oil. An optimized set was obtained from confirmatory test for best tribological efficacy. From surface morphology and roughness study of the worn pin samples, it was inferred that ball bearing and mending mechanisms occur. Further, from film thickness investigation, the lubrication was observed as mixed elasto-hydrodynamic (EHL) lubrication.

**Keywords:** Ball Bearing; Frictional Force; Gear Oil; Graphene; Mending Effect; Wear

## **Title of Paper: A Multi-faceted Review on Industrial Grade Nanolubricants: Applications and Rheological Insights with Global Market Forecast**

Results in Engineering, Elsevier, 25, March 2025, Online ISSN: 2590-1230

DOI: <https://doi.org/10.1016/j.rineng.2024.103628>

**Co-authors:** Sikta Panda, Niranjana Kumar, Subrata Kumar Ghosh, Ankit Kotia, Jayant Giri, Mohammad Kanan & T Sathish

**Abstract:** The formulation of colloidal suspension with nano-dispersants in different engine and gear oils is gaining momentum owing to its vast industrial applicability. Throughout the machine's service life, the time-weighted average viscosity of the lubricant has the biggest impact on energy usage. The best option, in terms of energy consumption, is frequently in the middle. Recent investigations have confirmed the anomalous rheological behavior of nanolubricants. This article introduces the current advancements and implementation of nanoparticles as additives, reviews and presents a comprehensive study on the available rheological studies. Classical models and developed correlations for estimating the viscosity of industrial engine and gear oils have been precisely summarized. A detailed analysis on the influential elements such as solid particle concentration and temperature on viscosity is also performed. Various nano-lubrication mechanisms have been discussed to supplement the perspective on the interactions of nanolubricants with solid surface at a microscopic level. This study also focuses on the market growth analysis of industrial lubricants and its probable impact on the environment. Special focus on cost economics of nanolubricants has been put for efficient energy savings. Also, efforts have been made to explore the possibilities in nanolubricant business in post-pandemic world.

**Keywords:** Nanolubricants; Engine Oils; Gear Oils; Viscosity

## **Discount at the Samsung e-store for IEI Corporate Members**

Exclusive access to the Samsung e-store for IEI Corporate Members. This shall enable the Corporate Members to procure the Samsung Products in a discounted rate. The Samsung e-store can be accessed at [www.samsung.com/in/multistore/iei](http://www.samsung.com/in/multistore/iei) using your Membership No. and email id/Mobile.

# Publication by Members

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**Dr Manasi Ravindra Mulay, AMIE**

Postdoctoral Researcher  
IIT Bhubaneswar, Odisha  
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**Title of Paper: Review of Bio-Inspired Green Synthesis of Titanium Dioxide for Photocatalytic Applications**

Catalysts, MDPI, 14(11), October 2024, Special Issue: Cutting-Edge Photocatalysis, EISSN 2073-4344

DOI: <https://doi.org/10.3390/catal14110742>

**Co-authors:** Siddharth V. Patwardhan & Natalia Martsinovich

**Abstract:** Titanium dioxide ( $\text{TiO}_2$ ) is an important photocatalyst that is widely studied for environmental applications, especially for water treatment by degradation of pollutants. A range of methods have been developed to produce  $\text{TiO}_2$  in the form of nanoparticles and thin films. Solution-based synthesis methods offer the opportunity to tune the synthesis through a choice of reagents, additives and reaction media. In particular, the use of biomolecules, such as proteins and amino acids, as bio-inspired additives in  $\text{TiO}_2$  synthesis has grown over the last decade. This review provides a discussion of the key factors in the solution-based synthesis of titania, with a focus on bio-inspired additives and their interaction with Ti precursors. In particular, the role of bio-inspired molecular and biomolecular additives in promoting the low-temperature synthesis of titania and controlling the phase and morphology of the synthesized  $\text{TiO}_2$  is discussed, with a particular focus on the interaction of  $\text{TiO}_2$  with amino acids as model bio-inspired additives. Understanding these interactions will help address the key challenges of obtaining the crystalline  $\text{TiO}_2$  phase at low temperatures, with fast kinetics and under mild reaction conditions. We review examples of photocatalytic applications of  $\text{TiO}_2$  synthesized using bio-inspired methods and discuss the ways in which bio-inspired additives enhance photocatalytic activity of  $\text{TiO}_2$  nanomaterials. Finally, we give a perspective of the current challenges in green synthesis of  $\text{TiO}_2$ , and possible solutions based on multi-criteria discovery, design and manufacturing framework.

**Keywords:**  $\text{TiO}_2$ ; Bio-Inspired; Green Synthesis; Amino Acids; Sustainable; Photocatalyst

# Nota Bene

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We would like to thank our erudite members for sharing their professional achievements through the IEI Epitome and making the content more abounding and at the same time inspiring many others to share their accomplishments as well. To streamline the process and make it convenient for the member to give their inputs we would like to obtain the information in a more structured and comprehensive manner. We would request our members to send the details of their achievements as per the appended formats only.

## FORMAT FOR ACHIEVEMENT BY MEMBERS

A passport size  
color photograph  
(scanned image)

(i) Prefix (Er/Dr/Prof)	
(ii) First Name	
(iii) Middle Name (if any)	
(iv) Surname (Last Name)	
(v) Email and Mobile Number	
(vi) Designation	
(vii) Organization of affiliation	
(viii) Membership No (please use the prefix F/M/AM as the case may be)	
(ix) Details of Award/Achievement#	
(x) Month & Year of Achievement/ Date of Achievement	
(xi) Supporting Documents/links [which are clearly indicative of the incumbent's achievement(s)]	

*# Reporting of Award of stipend/fellowship at PG/PhD level and awards from esoteric events/communities may be avoided.*

## FORMAT FOR PATENT / DESIGNS / TRADE MARKS / GEOGRAPHICAL INDICATIONS BY MEMBERS

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(i) Prefix (Er/Dr/Prof)	
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(vi) Designation	
(vii) Organization of affiliation	
(viii) Membership No (please use the prefix F/M/AM as the case may be)	
(ix) Tick the appropriate BOX	<input type="checkbox"/> Patent <input type="checkbox"/> Designs <input type="checkbox"/> Trade Marks <input type="checkbox"/> Geographical Indications
(x) Issuing Authority	
(xi) Serial No	
(xii) Patent No	
(xiii) Date of filing (DD/MM/YYYY)	
(xiv) Date of Grant (DD/MM/YYYY)*	
(xv) Patentee	
(xvi) Details of Patent	
(xvii) Term for which the above (ix) has been granted	

\* Copy of Certificate of the Grant of Patent

# Nota Bene

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## FORMAT FOR PUBLICATION(S) BY MEMBERS — PAPERS

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(viii) Membership No (please use the prefix F/M/AM as the case may be)	
(ix) Title of Paper	
(x) Name of Journal/Proceeding/Technical Volume	
(xi) Volume No (Not required for Indian Engineering Congress)	
(xii) Issue No (Not required for Indian Engineering Congress/Annual Technical Volumes of IEI)	
(xiii) Theme (Only for Technical Volumes of IEI)	
(xiv) DOI: (Not required for Indian Engineering Congress/Annual Technical Volumes of IEI)	
(xv) ISSN	
(xvi) Date of Publication (Date-Month-Year)	
(xvii) Co-authors (if any)	
(xviii) Abstract in full	
(xix) 5/6 Keywords	
(xx) Supporting Documents/links [which are clearly indicative of the incumbent's achievement(s)]	

*\* publications in local seminar, conference and symposia will not be accounted*

# Nota Bene

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## FORMAT FOR PUBLICATION(S) BY MEMBERS — BOOKS/ BOOK CHAPTERS

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(vi) Designation	
(vii) Organization of affiliation	
(viii) Membership No (please use the prefix F/M/AM as the case may be)	
(ix) Title of Book	
(x) Title of Book Chapter	
(xi) Book Chapter Number	
(xii) Publisher Details	
(xiii) ISBN	
(xiv) Date of Publication (Date-Month-Year)	
(xv) Co-authors (if any)	
(xvi) About the book (100-150 words)	
(xvii) Supporting Documents (complimentary copies for IEI Headquarters)/links [which are clearly indicative of the incumbent's achievement(s)]	

*\* accommodate works published in journals/reputed conference proceedings/books for the last one year*

# Notification for Advertisement in IEI Epitome

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The Institution of Engineers (India) reserves a coveted privilege in being the largest multi-disciplinary professional body of engineers encompassing 15 engineering disciplines with a Corporate membership of over 2.61 lakhs maintaining a national/international presence through hundred twenty four Centres and six Overseas Chapters, Fora's and Organ (Engineering Staff College of India). The Institution has been disseminating the various information through IEI-Epitome and other publications.

We would like to share with you that we are now providing the facility to advertise engineering / technical products/services, information brochure, recruitment notices etc. in our official publication portal IEI Epitome (12 issues-196000 reach online). Besides, IEI Epitome is also uploaded on our website ([www.ieindia.org](http://www.ieindia.org)) on a monthly basis and is accessible to all free of cost. Given its immense footprint in the engineering and technical diaspora spanning the globe, IEI with its distinguished heritage of a century provides you the ideal portal to connect with the National and International Engineering and Technical Community at very competitive rates. We invite you to take this unique and privileged opportunity to advertise and communicate your service and product portfolios under our prestigious banner and make us your brand emissaries in your promotional campaigns.

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### CONTINUING PROFESSIONAL DEVELOPMENT PROGRAMMES (CPDP) FOR THE MONTH OF FEBRUARY 2024

Sl. No.	Name of the Course	Scheduled Dates
1.	IT Tools & Techniques for Office Administration	03 - 05 Feb 25
2.	Robotics for industrial automation	04 - 06 Feb 25
3.	Spring Coiling & Testing	04 - 06 Feb 25
4.	Intellectual Property Rights (IPR) – Patent	04 - 06 Feb 25
5.	Contract Management A Dispute Resolution in Engineering Projects	03 - 07 Feb 25
6.	Planning, Design & Installation of Community Micro Irrigation System	03 - 07 Feb 25
7.	Best Practices in O&M of Coal & Ash Handling Plants	04 - 07 Feb 25
8.	Online Monitoring Industrial Emission Effluent (Technical Guidelines and Demonstration)	05 - 07 Feb 25
9.	Personality Development Programme for Representatives of Workers in Industry	05 - 07 Feb 25
10.	Commercialization	11 - 13 Feb 25
11.	Cyber Forensic Tools & Investigation Process	10 - 14 Feb 25
12.	Engineering Simulation using ANSYS & CFD	10 - 14 Feb 25
13.	Climate Resilient Water Supply System Design for Sustainability	12 - 14 Feb 25
14.	Franchise Models of Distribution Systems - Issues and Challenges	12 - 14 Feb 25
15.	5S for Workplace Excellence	12 - 14 Feb 25
16.	Project Management using MS Project and Primavera Software	17 - 19 Feb 25
17.	Personality Development (An Ordinary to Extraordinary Personality Empowerment)	18 - 20 Feb 25
18.	Desalination Process – Planning, Design & Operation	19 - 21 Feb 25
19.	Mine Geology & Advanced Exploration Techniques	19 - 21 Feb 25
20.	Cyber Security Issues in Power Sector	19 - 21 Feb 25
21.	Satellite based property mapping in Urban Local Bodies	25 - 27 Feb 25
22.	Contract Management and Conflict Resolution in Engineering Projects	25 - 27 Feb 25
23.	Preparation of DPR and Tender Documents for Sewage Treatment Plant.	26 - 28 Feb 25
24.	Boiler Tube Failure Analysis & Preventive Measures	26 - 28 Feb 25
25.	Internal Auditor Training for AS 9100 Rev D	26 - 28 Feb 25