

# ASM INTERNATIONAL CHENNAI CHAPTER



## HIGHLIGHTS

**Accomplishment  
s, Awards &  
Honours**

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Independence  
Day" - page 25**

**ASMICC June 2022**

**Inauguration of ASM Material  
Advantage Student Chapters at  
Sri Sivasubramaniya Nadar  
College of Engineering, Chennai  
Anna University, Chennai  
VIT Bhopal University, Bhopal, MP  
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**Members  
Achievements**

**Address for Correspondence  
ASM International Chennai Chapter  
Pead Apartments, Plot No, 2113,  
13th Main Road, Anna Nagar Chennai-  
600 040**

**Upcoming Events  
Students Camp  
HTSE -2023**

**[www.asmchennaichapter.com](http://www.asmchennaichapter.com)**

## Office Bearers of ASM International Chennai Chapter



**Dr. M. Kamaraj**  
Chairman  
IIT Madras



**Mr. N. Sampath Kumar**  
Vice Chairman &  
Online Membership  
chair Ambattur Metal  
Treaters



**Mr. Shankar  
Subburathinam,**  
Chapter Vice  
Chairman  
Caterpillar India P  
Ltd



**Prof. Srinivasa  
Rao Bakshi, Vice  
Chairman  
IIT Madras**



**Dr. Shubrajit Bhaumik,**  
Secretary, Wagner High  
Quality Lub. India



**Dr. Sushanta  
Kumar Panigrahi,**  
Jt. Secretary,  
IIT Madras



**Mr. R.J Venkatesh,**  
Treasurer  
Savita Oil  
Technologies



**Mr. R.V Chari,**  
Chair- Young  
Member  
GH Induction P  
Ltd



**Dr. T.M. Sridhar,**  
Chair  
Newsletter  
University of  
Madras



**Mr. V. P.  
Parthasarathy**  
Education Chair  
Brakes India Ltd.



**Mr. C.  
Renganathan**  
MEI Chair  
Chennai Metco  
Pvt. Ltd.

## Past Chairs of ASM International Chennai Chapter



**Dr. T. Sundararajan**  
Vice President  
Wheels India



**Dr. U. Kamachi Mudali**  
Vice Chancellor  
VIT University, Bhopal



**Dr. B.S. Murty**  
Director  
IIT Hyderabad



**Mr. B. K. Venkatesh**  
Chair, Awards  
Techmat Enterprises



**V. L. Sridharan**  
Long Term Planning, Chair  
Consultant



**Dr. Bhanu Shankar Rao**  
Professor Em.  
Hyderabad

## Executive Committee



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Scanray Ltd



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Tube Investments  
India Ltd



**Dr. Murugaiyan  
Amirthalingam**  
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**Mr. G. Sajikumar**  
Maxwarm Engineering



**Mr. S. P. Rajinikanth**  
Ambattur Heat Treaters



**Mr. R. Jayagovindan**  
Consultant





# NEWSLETTER

**ASM International  
Chennai Chapter**

**ASM June 2022**



## **Chairman's Message**

Dear Members,

It gives me great pleasure in meeting you in the second newsletter of 2022. We are happy that we have conquered safely the fourth wave of n-Covid 19 pandemic situation. ASM Chennai chapter has already conducted two technical talks physically with a great number of participants with enthusiasm. During this period many graduates, and faculty from IIT Madras, scientists from IGCAR and professionals from Industries became ASM members of the Chennai chapter. I am happy to mention that we have fulfilled the cherished commitment to ASM International and India Council in achieving the membership target.

I am delighted to inform you that we have organised two online workshops on the "Thermo-Calc Hands-on Training Course" on January 24-28, 2022, & March 15-19, 2022. This program was conducted jointly by ASM International, Chennai Chapter, with the support of Thermo-Calc Software Sweden and their Indian representative Bhanu Scientific Systems Pvt. Ltd., Hyderabad. The program was intended to make the participants familiar with Thermo-Calc and databases in GUI and Console mode. Nearly 80 participants from academia, R&D labs, and industry benefitted from the course. I would like to thank Prof. Harikumar of IIT Madras for organising the event in an excellent manner.

ASM Chennai chapter has made a marvellous contribution in establishing three new Material Advantage (MA) chapters at SSN, Chennai, Anna University, Chennai and VIT-Bhopal, and reviving the existing MA chapters at PSG College of Technology, Coimbatore, and Sri Manakulavinayagar Engineering College (SMVEC), Madagadipet (Pondicherry). MA chapters of NIT, Trichy and SRMIST, Chennai are active in conducting various events. I wish to record my deep sense of gratitude and profound thanks to all our Industrial members for their generous support in establishing the MA chapters. The most important event recently held was Trustee Visit on 28th May by Dr U. Kamachi Mudali, Trustee, ASM International to participate in the chapter meeting and deliver a talk on "E-Waste Management Towards Circular Economy". Prof. Ravi Ravindran, Past President, ASM International, USA was a Special Guest on this occasion. It was a great opportunity to discuss a strategy to increase the memberships and sustainability of MA chapters programs, and organise the HTSE-2023 International conference in a successful manner.

In this issue, we have published three technical articles which are relevant to industries and academic, R&D professionals. I am appealing to all members to take part enthusiastically in the forthcoming HTSE-2023 international conference. I thank all the members for their continued support and we look forward to working with you in 2022 and years to come.

Prof. M. Kamaraj  
Chairman ASMICC



### “Thermo-Calc Hands-on Training Course”

conducted by

**Professor K.C. Hari Kumar, Metallurgical & Materials Engineering, IIT Madras**

Organized by

**Department of Metallurgical & Materials Engineering, IIT Madras**

**ASM International, Chennai Chapter**

In collaboration with

**Bhanu Scientific Systems Pvt. Ltd., Hyderabad**

**ASM International, Chennai Chapter, with the support of Thermo-Calc Software Sweden and their Indian representative Bhanu Scientific Systems Pvt. Ltd., Hyderabad, conducted two online editions of “Thermo-Calc Hands-on Training Course” from January 24-28, 2022, and March 15-19, 2022. The course was taught by Professor K C Hari Kumar of Metallurgical & Materials Engineering, IIT Madras. The program was intended to make the participants familiar with Thermo-Calc and databases in GUI and Console mode. Each day had two hours of training sessions. Applications covered the computation of thermochemical properties, thermophysical properties, and phase equilibria of engineering materials and slags. Nearly 80 participants benefitted from the course. There was a huge demand for the course. Nearly 80 participants from academia, R&D labs, and industry benefitted from the course.**

Professor K.C. Hari Kumar is currently Professor in the Department of Metallurgical and Materials Engineering (MME) at Indian Institute of Technology Madras (IITM), Chennai, India. He did his Masters' degree in Metallurgical Engineering, IIT Kanpur, India. Subsequently, he obtained his doctorate at IIT Delhi in 1992. He joined in Metallurgical and Materials Engineering as visiting faculty at IIT Madras in 2002. Prof. Harikumar specialized in the field of Computational Materials Thermodynamics (CALPHAD) and his current research include Gibbs energy modelling of materials employing Calphad, Computation of Phase Diagrams, Applications of density functional theory in materials science, Modelling of diffusion-controlled transformations, Alloy design using physical metallurgy principles & computational thermodynamics. He has been a recipient of the following awards/Recognitions: Associate Editor, Calphad Journal (An Elsevier Journal) (2004–), Associate Editor, Journal of Phase Equilibria and Diffusion (An ASM-Springer Journal) (2021–), Key Reader, Metallurgical & Materials Transactions A (2013–), Editor Board Member, Journal of Innovative Materials in Extreme Conditions, Serbian Society for Innovative Materials in Extreme Conditions (SIM-EXTREME), Belgrade, Serbia. (2020–), Member, Alloy Phase Diagram International Commission (APDIC) (2019–), Member, Editorial Board, MSI Eureka, Materials Science International Team (MSIT), Stuttgart, Germany (2020–), Since 1988: Author or coauthor of nearly 85 scientific publications in international journals with peer review system (h-index 27, Google Scholar), Contributed nearly 25 book Chapters. He collaborates with a large number of national and international institutions and organizations. His contact details are: Email: kchkumar@iitm.ac.in ; Phone: +91-44-2257 4766 (office) ; URL: <https://mme.iitm.ac.in/kchkumar>

#### Following organization were represented:

- IIT (- Kharagpur, Madras, Bombay, Indore, Jodhpur, Bhubhaneswar, Palakkad)
- NIT- (Rourkela, Tiruchirappalli, Warangal, Surathkal, Hamirpur)
- Defense Metallurgical Research Laboratory, Hyderabad
- Bhabha Atomic Research Center, Bombay
- Indira Gandhi Centre for Atomic Research, Kalpakkam
- Institute for Plasma Research
- College of Engineering Pune
- PSG College of technology, coimbatore
- RGUKT-Basar
- Indus University
- The University of Queensland, Australia
- Aalto University, Finland
- Jindal Steel Works, Salem
- Wheels India



# Accomplishments

## Dr. U. Kamachi Mudali FASM and Trustee, ASM International (2021-2024)

- Honoured with Platinum Medal of The Indian Institute of Metals, 2021 for sustained contributions to the metallurgical profession.
- Honoured with Life Time Achievement Award of the Electrochemical Society of India, Bangalore for the year 2021.

### Honour Lectures:

- Platinum Jubilee Independence Day Special Lecture, ASM Chennai Chapter, August 2021.
- Gandhi Jayanthi Special Lecture, Materials Advantage IIT Kanpur Chapter, October 2021.
- The Guru Talks - IIT Madras Alumni Lecture Series, IIT Madras Alumni Association, Chennai, November 2021.
- XXVII Tamhankar Memorial Lecture, IIM Hyderabad Chapter, Hyderabad, April 2022.
- First CorSciTech Distinguished Lecture Series, IIM Mumbai Chapter, IIT Bombay, April 2022.

### Editorial Responsibilities:

- Chief Editor, Journal of Electrochemical Society of India, Bangalore, 2021-2025.
- Editor-in Chief of Indian Institute of Metals-Springer Book Series, from 2020-till date.
- Editor-in Chief, Confederation of Indian Industry-Corrosion Management Committee Booklet Series, from 2019-till date.

### Book Publications:

- Co-editor, A Treatise on Corrosion Science, Engineering and Technology, Eds. U. Kamachi Mudali, T. Subba Rao, Rani P. George, S. Ningshen, Radhakrishna G. Pillai, T.M. Sridhar, Springer Nature Publishers, 2022.
- Co-editor, Recent trends in Electrochemical Science and Technology, Eds. U. Kamachi Mudali, H. Nagaswarupa, S.T. Aruna and Dinesh Rangappa, Springer Nature Publishers, 2022.

### IITM -Chair Professor



Prof. Kamaraj is currently Professor in the Department of Metallurgical and Materials Engineering (MME) at Indian Institute of Technology Madras (IIT Madras), Chennai, India. Recently he has been selected as **Chair Professor** in the Dept of MME, IIT Madras. He has made outstanding research contributions in tribological behaviour of coatings, dissimilar welded joints and hot corrosion of advanced materials for aerospace, automobiles, and power plant applications. His research articles have been cited ~4204 times (H index -36). Prof. Kamaraj has been cited Top 2% of scientists from India in Materials.. Currently Prof. Kamaraj is the chairman of ASM international, Chennai Chapter, and Vice-Chairman, NIGIS-SZ. He was a Fellow of the Indian National Academy of Engineering (FNAE) (2021), ASM International, USA (FASM, 2018), Indian Institute of Metals (FIIM, 2019), The Institution of Engineers (India) (FIE, 2017) and Indian welding society (FIWS, 2012).



CONGRATS

**Congrats**  
ON YOUR  
**milestone!**



# Accomplishments - Congratulations - Materials Advances Materials and Process, 2021-22 issues

## ASM ANNOUNCES 2021 AWARD PROGRAM RECIPIENTS

The ASM International Board of Trustees has named award program recipients for 2022. The awards program recognizes achievements of members of the materials science and engineering community. ASM had hoped to present awards in person in St. Louis, however the Awards Banquet held in conjunction with IMAT 2021 will not take place this year. Therefore, ASM will present these awards, along with awards from 2020, at the ASM Awards Banquet to be held at IMAT 2022, scheduled for September 13-16, 2022, in New Orleans. ASM looks forward to celebrating all the award winners from 2020-2022 in a big way in New Orleans. We promise it will be worth the wait!

### Distinguished Life Membership

**Mr. Pradeep V. Goyal, FASM**, chairman and managing director, Pradip Metals Ltd., Navi Mumbai, India, will receive this year's award "for his continuous lifelong dedication to promoting industrial activities in materials science and serving as a mentor to many underprivileged children at all levels." Distinguished Life Membership was established in 1964 and is conferred on those leaders who have devoted their time, knowledge, and abilities to the advancement of the materials industries.

### Honorary Membership

**Prof. C. Ravi Ravindran, FASM**, professor, mechanical and industrial engineering, Ryerson University, Toronto, will receive this year's award "for unique contributions to innovative processes and materials development, energy conservation and improved efficiency of powertrain systems, development of materials engineers through university-industry partnerships, and being a role model for students, researchers, engineers, and the materials community." Honorary Membership in the

Society was established in 1919 to recognize distinguished service to the materials science and engineering profession, ASM strategic plan and initiatives, and the progress of mankind.

### Engineering Materials Achievement Award

**Dr. Jason T. Sebastian, Mr. Chris Kern, Mr. Jeff Grabowski, Mr. Karen Taskin, Dr. Thomas S. Kozmel, and Prof. Gregory B. Olson, FASM**, from QuesTek Innovations LLC, Evanston, IL, will receive this year's award "for the design and commercialization of novel high-performance carburizable steels enabling more durable, lighter weight transmission gears with increased power density." Established in 1969, this award recognizes an outstanding achievement in materials or materials systems relating to the application of knowledge of materials to an engineering structure or to the design and manufacture of a product.



### Albert Sauveur Achievement Award

**Prof. Enrique J. Lavens, FASM**, distinguished professor, department of materials science and engineering, University of California, Irvine, will receive this year's award "for sustained and pioneering studies on the fundamental

## CHAPTERS IN THE NEWS HIGHLIGHTS

### CHAPTERS IN THE NEWS

#### Ontario Hosts Mercedes Engineer

The ASM Ontario Chapter held an exciting virtual event on February 2 as part of the world class Speaker Series. They hosted Stephen Edge, the senior materials engineer of Mercedes High Performance Powertrains, to provide them with a rare look into the materials engineering that exists under the hood of the Mercedes F1 car. In his talk, Edge also conveyed the fast-paced world that the materials engineers at the company operate in. At top speed, they develop new engineering processes as well as characterize and introduce new materials to the powertrain.



#### Cleveland Hears about Battery Material

Members of the Cleveland Chapter learned about "The Role of Graphite in Lithium-Ion Batteries" during their online technical meeting on January 18. The speaker, Ryan Paul, is a carbon materials scientist in the Carbon and Composites group at Oak Ridge National Laboratory. Paul described the fundamental role that graphite has in the workings of a lithium-ion battery and explained why graphite will not be soon replaced at large scale. The implications of natural and synthetic graphite availability and recyclability were also discussed.



### ASM CONNECT

#### Upcoming Chapter Meetings

Stay informed of future chapter meetings through announcements in ASM Connect. ASM members are welcome to attend any virtual/hybrid meetings of chapters even outside their geographic area. Learn more at [connect.asmiinternational.org](https://connect.asmiinternational.org).



Congratulations to the ASM Chapters celebrating milestones of serving local members!

Akron—75 Years  
Bangalore—15 Years  
"Thank you for your commitment!  
We look forward to celebrating your future success!"

### MEMBERS IN THE NEWS

#### Mudali Receives IIM Platinum Medal

**U. Kamachi Mudali, FASM**, was awarded the prestigious Platinum Medal for 2021 from the Indian Institute of Metals (IIM) for his outstanding contributions to the metallurgical profession over the past four decades. Mudali served as president of IIM, with its more than 10,000 members, during 2019-2020. He is listed among the top 2% of scientists from India working in the field of materials based on an analysis by Stanford University. He is vice chancellor of VIT (Vellore) University. Mudali is currently a trustee of ASM International, serving from 2021 to 2024. He was previously chair of the ASM Chennai Chapter 2015-2017 and received their Distinguished Achievement Award. He is a fellow of 12 societies.



#### Liu Named Fellow of TMS

**Zi-Nai Liu, FASM**, Dorothy Pace Knight Professor of MSE at Penn State, has been named a Fellow of the Minerals, Metals and Materials Society (TMS), the society's highest honor. Liu is renowned for his seminal contributions to the fundamentals of thermodynamics and for developing computational approaches and tools for predictions of properties and design of materials. He was president of ASM International from 2019 to 2020 and received ASM's J. Willard Gibbs Phase Equilibria Award in 2016. Liu earned a bachelor's degree in metallurgy from Central South University in China, a master's degree in MSE from the University of Science and Technology Beijing, and a doctorate in physical metallurgy from the Royal Institute of Technology in Sweden.



- **Dr. U. Kamachi Mudali, FASM receives IIM Platinum Medal**
- **Distinguished Life Membership**
- **Mr. Pradeep V. Goyal, FASM**
- **Honorary Membership**
- **Prof. C. Ravi Ravindran, FASM &**
- **Prof. M. Kamaraj, Fellow of the Indian National Academy of Engineering (FNAE) (2021)**

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## HIGHLIGHTS MEMBERS IN THE NEWS

### Kamaraj Elected INAE Fellow

**Prof. Muthuswamy Kamaraj, FASM**, was named a Fellow of the Indian National Academy of Engineering (INAE). He is currently a professor in the department of metallurgical and materials engineering at Indian Institute of Technology Madras, Chennai, India. He has made outstanding research contributions in tribological behavior of coatings and dissimilar welded joints of advanced materials for automobile, aerospace, and power plant applications. Kamaraj has 254 publications, including journal articles, conference proceedings, and book chapters. His research has been cited over 4200 times and he was named among the top 2% of scientists from India in materials (2020). Kamaraj now serves as chair of the ASM Chennai Chapter and was appointed to the 2021 ASM Nominating Committee.



Kamaraj

### Prucha Wins AFS Gold Medal

**Thomas Prucha** is the 2022 winner of the William McFadden Gold Medal from the American Foundry Society (AFS). He will receive the society's highest honor at the annual banquet at CastExpo 2022, April 23-26, in Columbus, Ohio. The award honors Prucha's "outstanding achievements, service, and contributions to the metalcasting industry and his visionary leadership steering the industry toward new technological horizons on the global level." Prucha is editor-in-chief of the *International Journal of Metalcasting* and president of Metal Morphosis LLC. In 2021, he was a Hoyt Memorial Lecturer at the virtual Metalcasting Congress. Prucha is a member of the ASM Detroit Chapter.



Prucha

## MATERIALS & PROCESS EDITORIAL

### APRIL 2022

#### Materials Testing & Characterization

#### Highlighting:

- Integrating Materials Characterization
- Ultrasonic Fatigue Testing
- ITSC and SMST Show Preview

#### Advertising Bonus and Distribution

#### Show Issue for ITSC 2022 and SMST

- ITSC: May 4-6, Vienna
- SMST: May 16-20, San Diego

#### Special Supplements:

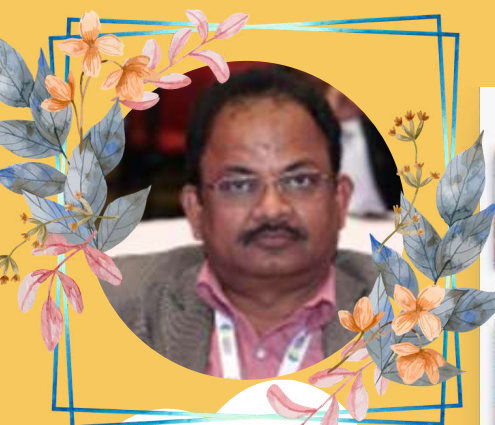
- *International Thermal Spray* and newsletter covering coatings in defense industries, along with TMS
- *SMST NewsWire* newsletter covering superelastic technologies for biomedical applications, along with SMST



# Accomplishments - Congratulations -



**Dr. Srinivasa Rao Bakshi, Professor**  
**Dept. of Metallurgical and**  
**Materials Engineering was**  
**awarded Institute Research and**  
**Development Award (Mid-career**  
**Level) by IIT Madras for his research**  
**accomplishments. Dr. Bakshi**  
**received the award from**  
**Shri N. Lakshmi Narayanan (Former**  
**Vice Chairman, Cognizant**  
**Technologies) in presence of**  
**Prof. V. Kamakoti (Director, IIT**  
**Madras).**



**Congratulations**  
**Dr. N. Rajendran, Professor**  
**and Head, Department of**  
**Chemistry, Anna**  
**University, Chennai on**  
**receiving the Research**  
**Excellence Award from**  
**Centre for Technology and**  
**Development Transfer,**  
**Anna University, Chennai**  
**& Celebrating the reunion**  
**with this Research Group**  
**members on 8th August**  
**2021**

## Prof. N. Rajendran Research Group



**Dr. Sridhar T M-Asst. Professor,**  
**Department of Analytical**  
**Chemistry, Placement Officer,**  
**University of Madras & Faculty**  
**Advisor, NIGIS SZ student section.**

- **Excellence in Corrosion Science & Technology in Research & Education award by NIGIS Nov 2021, Mumbai**
- **Appointed as Editorial Board Member of Journal of Electrochemical Society of India for 2021-2025**
- **Elected Joint Secretary, The Academy of Sciences, Chennai (2022-24)**





# Accomplishments

## FLUIDTHERM

**The pandemic years have been kind to Fluidtherm in terms of the number of technology orders received; 6 off 1700°C pusher furnaces for nuclear fuel processing, orders from Austrian and Canadian tech giants, supply of a complete graphene processing plant to Tata Steel, introduction of furnaces for graphite processing, expansion of our COGANITE gas nitriding franchisee base. Our exports included 4 furnaces to a US Army contractor for the processing of Tungsten Heavy Alloy parts at 1600°C in 100% hydrogen, first shipment to Taiwan and Israel and expansion of our regular furnace supplies to customers S.Korea and EUs and recently 3 additional furnaces to China (reversing the trend).**

**N.Gopinath, Managing Director obtained an Indian patent No.327561 for a novel nitriding type process and patent application has been made for a low gas consuming mesh belt Furnace design.**

**V.Raghunathan, Director has expanded our list of recipes for nitriding of rare alloys, a process that combines brazing and solutionising of aluminium impellers, a device to enhance the cleaning efficiency of tiny parts, a process to sinter long filter tubes in Cu & SS and a gas quench bainite hardening system.**



**Tata Steel  
Graphene plant  
(supplied by  
Fluidtherm) being  
inaugurated by  
Mr. Ratan N Tata**



INTELLECTUAL  
PROPERTY INDIA  
INTEGRATION OF TRADE MARKS  
AND PATENT RIGHTS

Patentee : GOPINATH.N

It is hereby certified that a patent has been granted to the patentee for an invention entitled A NOVEL METHOD OF IMPROVING THE MECHANICAL PROPERTIES OF POWDER METALLURGY PARTS BY GAS ALLOYING as disclosed in the above



# AWARDS & HONOURS

**Mr. B K Venkatesh, MD, Endotherm Fluids India Private Limited received "Best collaborative Supplier Award" from the Managing Director of "Mando Automotive India Limited" for the year of 2021 – 2022.**

**His team developed an imported substitution of "Universal joint spiders" & "Driveshaft spiders" to Mando & Woosu. Within 2 years they have supplied 4 million components with zero defects.**

**[www.endocomponents.com](http://www.endocomponents.com)**



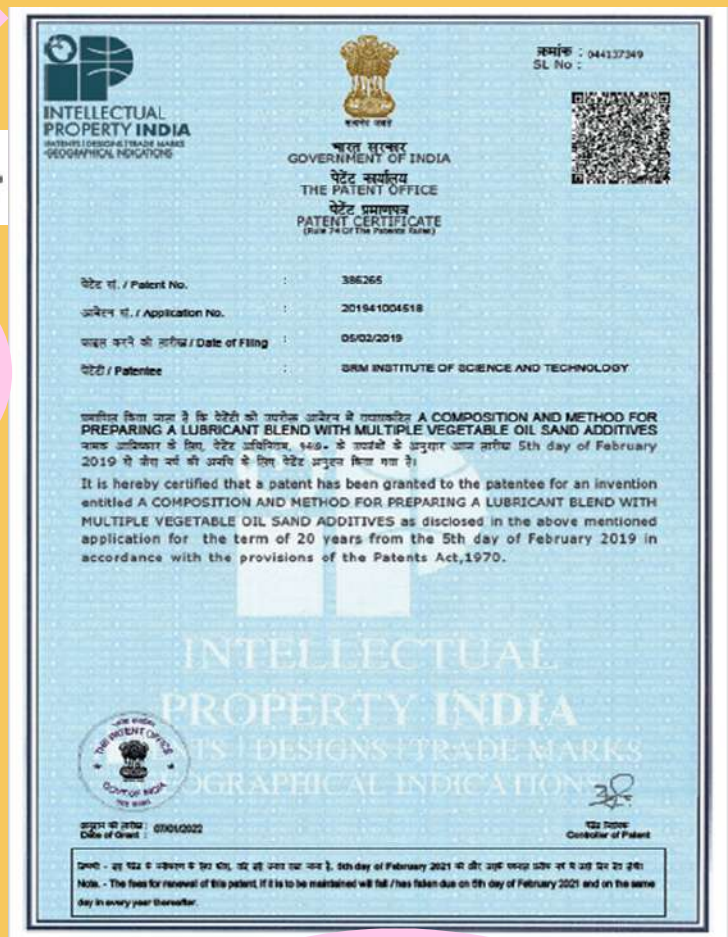
**D. Ravi Kumar  
General Manager – Metallurgical Service  
No.96, Aranvoyal Village,  
Thiruvallur District, TN -602025**



**Congratulations on  
being elevated as  
General Manager –  
Metallurgical  
Services**

**Contributions to material science during last year include**

- 1. Machinability improvement for SS304L steel by controlled chemistry and solution anneal cycle.**
- 2. Controlled Nitriding of fuel components without ammonia dissociator by precise process control of ammonia flow during diffusion cycle & balanced batch quantities.**
- 3. Improving resistance to relative wear of the casting parts by selective resin impregnation at the asperities of pump housing.**



**Congratulations inventor  
Dr. Shubrajit Bhaumik for your patent**

**The patent is in the area of area of Nano-lubricant which is about an additive package which has shown reduction in friction between steel surfaces by 30%-40%**



# Patents

**Patent Title: A low temperature method for fabrication of dense Boron Carbide composites**  
**Patent No: 376105**

## Description:

Boron carbide (B<sub>4</sub>C) is one of the most widely used structural ceramic with characteristic properties like low density (2.52 g/cc), high hardness (~38 GPa) and high elastic modulus (~450 GPa). B<sub>4</sub>C had wide range of applications from defense sector to nuclear industry as a neutron absorber, body armor material, blast nozzles, cutting tools, control rods, etc. Processing of B<sub>4</sub>C is extremely difficult due to its covalent nature and low diffusion coefficient. It requires high temperatures (> 2100 °C) and pressures (30-40 MPa) for densification. In this context, we developed a new method for synthesizing fully dense B<sub>4</sub>C composite at an SPS temperature of 1400 °C through spark plasma sintering route using reactive Ti-B mixture as sintering aid. In this method, Ti-B mixture was mechanically activated using high energy ball milling. This mixture was added to Boron Carbide and milled again for better dispersion. Then the spark plasma sintering was carried out using B<sub>4</sub>C-Ti-B powder mixture. The results showed good promise for the low temperature sintering. This process is the simplest and fastest method for fabricating B<sub>4</sub>C composites. This process can be used to manufacture discs and tiles of B<sub>4</sub>C composite. B<sub>4</sub>C tiles are applicable in armour plates. The method described in this invention can be used to make tiles and can be cut into hexagonal shapes. These can be assembled together to make body armour plate.






**Congratulations**  
**Dr. Srinivasa Rao Bakshi**  
**IIT Madras**  
**for your successful patent**



**Congratulations**  
**Dr. Sushanta Kumar Panigrahi**  
**IIT Madras**  
**for your successful patent**



**S Chandraleka, ASM Student Member, Department of Analytical Chemistry, University of Madras, Chennai was awarded the NIGIS Corrosion Awareness Awards 2021 under the Student category for Best M. tech Thesis on Corrosion Science and Technology**

 <b>INTELLECTUAL PROPERTY INDIA</b> <small>PATENTS   DESIGNS   TRADE MARKS   GEOGRAPHICAL INDICATIONS</small>		 <b>भारत सरकार</b> <b>GOVERNMENT OF INDIA</b> <b>पेटेंट कार्यालय</b> <b>THE PATENT OFFICE</b> <b>पेटेंट प्रमाणपत्र</b> <b>PATENT CERTIFICATE</b> <small>(Rule 14 of The Patents Rules, 2003)</small>	क्रमांक : 044141880 SL No : 
पेटेंट नं. / Patent No.	398673		
अर्जन नं. / Application No.	202141024665		
प्रस्तुत करने की तारीख / Date of Filing	03/06/2021		
पेटेंटी / Patentee	INDIAN INSTITUTE OF TECHNOLOGY MADRAS (IIT MADRAS)		
अविष्कारक (एक या अधिक) / Inventor(s)	1. RAKESH KUMAR 2. DR. SUSHANTA KUMAR PANIGRAHI		
<p>प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में वर्णित A LOW-COST PORTABLE DEVICE FOR EVALUATING STRETCH FORMABILITY AT VARYING TEMPERATURES AND STRAIN-PATHS नामक आविष्कार के लिए, पेटेंट अर्जनानुसार, 1970 के अधिनियम के अनुसार आज तारीख जून 2021 के तीसरे दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुमत किया गया है।</p> <p>It is hereby certified that a patent has been granted to the patentee for an invention entitled A LOW-COST PORTABLE DEVICE FOR EVALUATING STRETCH FORMABILITY AT VARYING TEMPERATURES AND STRAIN-PATHS as disclosed in the above mentioned application for the term of 20 years from the 3<sup>rd</sup> day of June 2021 in accordance with the provisions of the Patents Act, 1970.</p>			
 <b>INTELLECTUAL PROPERTY INDIA</b> <b>PATENTS   DESIGNS   TRADE MARKS   GEOGRAPHICAL INDICATIONS</b>		दिनांक : 07/06/2022 Date of Grant : 07/06/2022  Controller of Patent	
नोट - इस पेटेंट के अधिनियम के तहत, यह पेटेंट 2021 के तीसरे दिन से जून 2021 के तीसरे दिन तक वैध रहेगा। Note - This patent shall remain in force from the 3 <sup>rd</sup> day of June 2021 and on the same day in every year thereafter.			



# ASM INTERNATIONAL CHENNAI CHAPTER ANNUAL GENERAL MEETING 8th October 2021

The annual general meeting was organized by ASM Chennai on 8th October 2020 at Hotel Radha Regent from 7:00pm. The event was graced by more than 31 members including Senior ASM Chennai Members, Student Members and New Members.

Prof. M. Kamaraj welcomed all the participants. He expressed his happiness to see all the participants healthy though all were grief stricken as we lost our beloved senior member Mr. K. Gunasekaran, Mr. R.G. Sadagopan and Mr. V. Parthasarathy. The Chapter will remain ever in debt to the members we lost for their selfless contribution for the Chapter. Prof. Kamaraj requested all members to join hands and increase the membership of the Chapter. He also indicated the opening of Material Advantage Chapters in SRMIST, NIT Trichy, Anna University, IIT Madras and Salem Engineering College. Prof. Kamaraj then invited Mr. Shankar Shubburathinam to brief about the Failure Analysis Workshops conducted by him during 2020-2021. Mr. Shankar highlighted the association and support of ASM US to ASM Chennai Chapter and indicated the Failure Analysis section of ASM International. Apart from 31 participants, the AGM was also graced by the presence of special invitees Dr. M. Sathya Prasad, Vice President Product Development, Ashok Leyland and Mr. Pari. This was followed by cocktail and dinner,



## **ASM Material Advantage Student Chapters at Sri Manakula Vinayagar Engineering College , Puducherry**

**The Material Advantage students' chapter was inaugurated at Sri Manakula Vinayagar Engineering College on 10-10-2014. The Chairman and Managing Director of SMVE Trust Shri. M.Dhanasekaran inaugurated the chapter. Dr.V.S.K.Venkatachalapathy, Director cum Principal delivered the keynote address. Dr. Kamachi Mudali, Chairman, ASM Chennai Chapter and other ASM members felicitated the function. SMVEC-ASM Chapters organised many workshops and seminars with the support of ASM Chennai Chapters.**

**The chapter has organized major events which include ASM Workshop on Materials for Automotive Industries (Oct 2015), ASM Workshop on Steels and Applications (March 2016) and ASM Heat Treatment and Surface Engineering Conference and Expo (May 2016)**



**The student chapter members of ASM Material Advantage participated in the Slogan writing contest for the celebration of Earth Day on 22-04-2022.**



**The Material Advantage student chapter of SMVEC has organized One Day Workshop on IPR & Design Patent on 26-04-2022 for the celebration of World Intellectual Property Day. Mr. P. Jayakumar, JS ARA TECH, Design Project Consultant, chaired the session and gave his remarks to illustrate the importance of IP, patentability assessment and the efforts being carried out by IPO for registration of IPRs.**



**SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE**

(An Autonomous Institution)

(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)  
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution & Accredited by NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107





Friday  
Posts  
SRM  
Ma  
chapter

## SRM MATERIAL FRIDAYS

### APPLICATION:

- **Superhydrophobic materials** are of interest for a variety of medical applications including: a) control of the local release of drugs after tumor resection, b) patterned cell growth to study cellular communication (i.e., from a biopsy), c) reduced bacterial adhesion on implants such as hip replacements, or d) stabilization of droplets or drive flow in microfluidics and diagnostic assays.
- And it definitely has an important role in textile and leather industry without any question.
- It has a big part to play in other machinery industries too as corrosion and rusted can be prevented by this method.



### REFERENCE:

- <https://en.wikipedia.org/wiki/ultrahydrophobicity>
- <https://www.slideshare.net/AnisSyed/superhydrophobic-materials>
- <https://www.researchgate.net/publication/309748146>

## SRM MATERIAL FRIDAYS

### Superhydrophobic Material

#### ABOUT:

- Ultrahydrophobic (or superhydrophobic) surfaces are highly hydrophobic, i.e., extremely difficult to wet. The contact angles of a water droplet on an ultrahydrophobic material exceed 150°.
- This is also referred to as the lotus effect, after the superhydrophobic leaves of the lotus plant. A droplet striking these kinds of surfaces can fully rebound like an elastic ball.
- Hydrophobicity comes also from the greek word Hydro(water) and Phobicity (fear) it refers to the physical property of a material that repels a mass of water.



which never reacts with water molecule, which means no stains 😊. This phenomenon can already be found in Lotus leaf. It's gonna rule the future.

Get to know more about it in our Material Fridays Post 😊  
Credit: Danushram K

### HISTORY:

Detre and Johnson discovered in 1964 that the superhydrophobic lotus effect phenomenon was related to rough hydrophobic surfaces, and they developed a theoretical model based on experiments with glass beads coated with paraffin or TFE telomer.

### FACTS:

- The greater the contact angle, the more hydrophobic a surface is. For example, the contact angle of water on lotus is  $\approx 140^\circ$ , hence that surface is termed superhydrophobic while water on plastic has a contact angle of  $90-140^\circ$ .
- The new hydrophobic material or superhydrophobic material that was created by a team of MIT nanomaterial scientists and mechanical engineers is said to



637 followers  
1h •

"A journey of a thousand miles starts with a single step" 🙏  
We have come quite some steps far with all of you as part of our growing family. 🙏  
We have been lucky to get such support from our followers, colleagues and friends. Thank you all for the same, keep showering us in the same love and share with your friends. 🙏

Come join our family to explore material science & engineering.



## THANK YOU

TO ALL THOSE WHO BELIEVED IN THE CHAPTER BY MAKING THE EFFORT TO FOLLOW IT SOCIALLY.

WE NOW HAVE,  
LINKEDIN- 500+ FOLLOWERS  
INSTAGRAM- 100+ FOLLOWERS, 100+ POSTS

FOR EVENTS AND UPDATES CHECK OUR

**MATERIAL ADVANTAGE CHAPTER, ASM INTERNATIONAL @ SRM UNIVERSITY & NIT TRICHY AND ASMICC JOINTLY ORGANIZED A WORKSHOP ON FRONTIERS IN MATERIALS ON 14 AUG 2021, ONLINE, 2.00 – 8.00 PM (IST)**

**75TH INDEPENDENCE DAY**

**WORKSHOP ON "FRONTIERS IN MATERIALS"**

**DATE : 14TH AUGUST 2021**  
**TIME : 2:00 PM - 8:00 PM (IST)**

Zoom link to join the meet  
<https://zoom.us/j/98695004799?pwd=WEpDUVdlbkp1T1pxOTVONk1pVnBtUT09>  
Meeting ID : 986 9500 4799  
Passcode : 123582

**PROGRAMME SCHEDULE**

**2:30 PM - 3:00 PM (IST): Inaugural Session**  
Prof. M. Kamaraj, Chairman, ASMICC

**3:00 PM - 4:00 PM (IST): Lecture 1**  
Prof. Christopher Berndt, Swinburne University of Technology, Australia  
Topic: Advances in Thermal Spray Coatings and Applications

**4:00 PM - 5:00 PM (IST): Lecture 2**  
Dr. M. Sathya Prasad, Ashok Leyland, Chennai  
Topic: Materials & Manufacturing for Future Mobility

**5:00 PM - 5:30 PM (IST): Break**

**5:30 PM - 6:30 PM (IST): Lecture 3**  
Dr. Debashish Bhattacharjee, Tata Steel Ltd., Kolkata  
Topic: New Materials for 21st Century

**6:30 PM - 7:30 PM (IST): Lecture 4**  
Prof. Zi-Kui Liu, PennState University, USA  
Topic: Designing and Tailoring Frontier Materials Processing and Properties

**7:30 PM - 8:00 PM (IST): Concluding Session**  
Dr. U. Kamachi Mudali, Trustee-Elect, ASM International, USA

**Coordinators**  
Prof. M. Kamaraj, Chairman, ASMICC  
Dr. Shushanta Kumar Panigrahi, Joint-Secretary, ASMICC  
Dr. Shubrajit Bhattacharya, EC, ASMICC  
Dr. A. Vinodh, Faculty Advisor, Material Advantage, SRM Institute of Science and Technology, Chennai  
Dr. V. Karthick, Faculty Advisor, Material Advantage, NIT Trichy



## SRMIST MATERIAL ADVANTAGE STUDENT CHAPTER



### CHAPTER OVERVIEW

SRMIST Material Advantage Student Chapter (SRMMASC) is a student program specifically created for undergraduate and graduate students enrolled in different engineering programs at SRMIST, to utilize the resources provided to them and combine the individual benefits of four societies into one great advantage for students. 2020 marked the year of inception of this Student Chapter. Taking a leap into a newer phase for the students of SRMIST. Born amidst the state of such a global pandemic, The Student Chapter still did its best to prevail through such tough times and is continuing to grow further while providing

a platform for the students to hone their technical, academic and soft skills. The Material Advantage Chapter at the SRM Institute of Technology- KTR is a collaborative initiative of the students from the Departments of Mechanical, Automobile, and Nanotech Engineering, of the university. Material Advantage SRMIST Student chapter is a non-profit organization, which serves as a platform to bridge the communication between students and Industry professional through various educational activities like workshops, presentations, technical challenges, etc.

### OUR VISION AND MISSION

- Our vision is to promote students a self-sought increasing knowledge of metallurgy, material science and engineering and to instill a professional pride in their chosen life.
- Our mission is to ensure a high level of service to our members in various areas like Networking, Education, and Career Development.

### LIST OF FEW EVENTS CONDUCTED

<i>Date of events</i>	<i>Name of the events</i>
27 Feb. 2021	Webinar on Entrepreneurship : Starting Up In Digital Times
01 Apr. 2021	Webinar on An outlook on Indian automobile market
27-29 Apr. 2021	Workshop on Lubrication in Automotive Industries
26 June. 2021	Webinar on Additive Manufacturing For Engineers
16-17 July. 2021	Webinar on Colour Theory and Painting Process In Automotive Industry
14 Aug. 2021	Workshop on Frontiers in Materials
25 Sept. 2021	Quiz on Basics Concepts of Mechanical Engineering
30 Oct. 2021	Webinar on Physics Informed Neural Network
11 Dec. 2021	Alumni Talk
9 Jan. 2022	Webinar on Lean Tools
13 Mar. 2022	Guest Lecture on Total Productive Maintenance

### SRMMASC OFFICE BEARERS



Dr. A. Vinodh, Faculty Advisor



Mr. Yash Sunkle,  
Chairperson



Mr. Sai Kowshik Dhanulipala,  
Vice Chairperson



Mr. Satyam Sai,  
Secretary



Mr. Ashish Paul,  
Creatives Head



## ASM Material Advantage Student Chapters at NIT Trichy

### MATERIAL ADVANTAGE - NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPALLI ANNUAL REPORT

MA NIT Trichy chapter has been thriving since its very inception in 2019, and every year following it, we have continued to grow as a chapter, with the participation of its members, under the leadership of the core and under the guidance of our faculty advisor, Dr Karthik. We have introduced various programs within the chapter, which may be broadly classified into 4 categories- namely the *Sir Alan Cottrell Memorial Guest lecture Series*, *Directions Guest Lecture series (Alumni series)*, *Student chapter informal meets* and *Events*.

The *Sir Alan Cottrell Memorial Guest lecture Series* was introduced by Material Advantage NIT Trichy Student Chapter with the intention to connect the student community with the researchers at the forefront of materials science to help us understand the various avenues and to introduce us to the various topics our field has to offer. As a part of the Sir Alan Cottrell Memorial Guest lecture Series of Material Advantage NIT Trichy Student Chapter, we have conducted 3 guest lectures to date (for the Fall 2021-22 term) by researchers/educationalists in their own field of expertise- namely '*Sustainable Metallurgy*', presented by Prof. Dr.-Ing. habil. Dierk Raabe, '*Additive Manufacturing for Aerospace Applications: An Industrial end-user perspective*', presented by Dr Alphons A Antonyamy and '*Density Functional Theory - Basics & Its Application in Energy Materials*', presented by Dr Sai Gautam Gopalakrishnan.

The *Directions Guest Lecture series* was begun as an initiative to provide the members of MA NITT with a clear idea of what lies ahead after their undergraduate studies – career paths, opportunities, etc from the experiences of the alumni of the Department of Metallurgical and Materials Engineering NIT, Trichy. In the context of post-graduate studies, Ms Meghna Narayanan of the batch of (2020) and Mr Sreenivas Raghuraman of the batch of (2021) gave talks on the various aspects – opportunities available, the application procedures, etc, for Masters and PhD programs in India and abroad respectively, and also elaborated on their research interests.

Furthermore, our chapter has strived for engaging events to expand its presence within the institute and even outside the same. We have done this through a combination of fun trivia events, joint events hosted with other institutes (and local chapters of the partner societies), and internal group learning sessions. This has allowed us to maximise our footprint towards popularising materials science. To name them, we have had '*Get, Set, Galvanise*' - a metallurgical and materials-themed trivia event aimed at the incoming batch of students. Our chapter also conducted a **hands-on group learning session** to help illustrate the applications of basic ML to materials specific problems. **Group accountability**

**sessions** were also conducted as part of a new initiative to make the most out of remote learning, we also started attending lectures conducted by third parties abroad (including workshops on crucial software for computational science, such as MATLAB) as a group.

As part of the **Independence Day celebrations**, in collaboration with SRM IST and the *Chennai chapter of ASM International*, our chapter co-organised a two-day event (including hosting and conducting proceedings). This event, titled "*Workshop on Frontiers in Materials*" included top lecturers from around the world, including Prof. Christopher Berndt, Swinburne University of Technology, Australia; Prof. Zi-Kui Liu, PennState University, USA, as well as an industry expert from Ashok Leyland. We also organised a short **Resume Drive**, covering the common issues seen in resumes, including systematic errors such as formatting and grammar, basic rules on how to formulate points in the CV and so on.

Last but not the least, our chapter is *not all work and no fun!* We have had informal chapter meets where we discuss the member's needs, convey chapter updates with regard to the initiatives taken also deliberate future events seeking everyone's inputs on the same. To further their interest, the core also assigned **roles of responsibilities** to the juniors. With respect to the social media front, we have an active LinkedIn and Instagram page where we post updates on chapter events, and engaging bi-weekly initiatives called "**Materialised**," a factoid series.



Left to right:

Archita V - Chairperson  
Ashwin T Shekhar - Vice-Chairperson  
Sriram A - General Secretary  
Sowmya Venkatesh - Treasurer

Dr V Karthik - Faculty Advisor





**Workshop on “Frontiers in Materials**  
**was jointly organized by ASMICC and Material Advantage**  
**Student Chapters of SRM Institute of Science and**  
**Technology (SRMIST), Kattankulathur and the National**  
**Institute of Technology, Tiruchirapalli (NITT).**  
**14th August 2021 (Online)**



**As India approached another significant milestone of its 75th Independence Day, ASM International Chennai Chapter (ASMICC) organized a Workshop and a Special Lecture to mark this grand occasion. Under the able guidance of Dr.U.Kamachi Mudali, Trustee-Elect, ASM International, USA, and the leadership of Prof. M.Kamaraj, Chairman ASMICC, the Workshop “Frontiers in Materials” was jointly organized by ASMICC and Material Advantage Student Chapters of SRM Institute of Science and Technology (SRMIST), Kattankulathur and the National Institute of Technology, Tiruchirapalli (NITT).**



**After welcoming the gathering by ASMICC member Dr.Shubrajit Bhaumik, the Chairpersons of the Materials Advantage Student Chapters, Mr.Tanmay Pharia (SRMIST) and Ms. V. Archita (NITT) presented the activities of each chapters. It is noteworthy that even in the pandemic situation our bright young generation kept their Chapters shining with several events. Dr. A. Vinoth, Faculty Advisor of SRMIST conducted the event in a smooth manner.**

**The following lectures were delivered in the workshop, by:**

- Prof. Christopher Berndt, Swinburne University of Technology, Australia - “Advances in Thermal Spray Coatings and Applications**
- Dr. M Sathya Prasad and Dr. Dhanasekaran, Ashok Leyland, Chennai - “Materials and Manufacturing For Future Mobility”**
- Dr.Debashish Bhattacharjee, Tata Steel, Kolkata - “New Materials for 21st Century”**
- Prof. Zi-Kui Liu, PennState University, USA - “Designing and Tailoring Frontier Materials Processing and Properties”**

**The Workshop was attended by 173 members throughout the day. Prof. Berndt took us through the journey of the thermal spray coatings. His lecture focused on the importance of thermal spray, its types, and its applications in industry. The future of mobility and manufacturing was well understood by the participants through the lecture of Dr.Sathya Prakash and Dr.Dhanasekaran. They highlighted the problems faced by the automotive industries and possible solutions. More advances in the materials were highlighted by Dr. Debashish Bhattacharjee, Tata Steel. His lecture threw light on recent applications of inclusion of nano materials in industrial applications. The energetic lecture of Prof. Zi-Kui Liu, PennState University 7 Former President, ASM International, USA, mesmerized the participants as he presented the Material Genome. Prof. Liu also encouraged the students and enlightened them by showing the benefits of becoming a member of Material Advantage Chapter.**

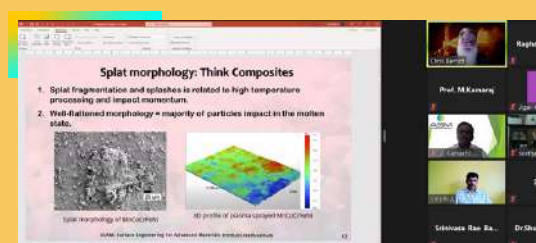
**Dr. U.Kamachi Mudali, Trustee-Elect concluded the session and brought out the excellent outputs of each lecture and appreciated ASM Chennai Chapter for organising such an excellent event. Dr.V. Karthik, Faculty Advisor of Materials Advantage NITT delivered the vote of thanks at the end of the event.**

## **Lecture I: Advances in Thermal Spray Coatings and Applications**

### **Prof. Christopher Berndt, Swinburne University of Technology, Australia**

**The lecture began with a comparison between the existing thin film coating techniques- including thermal spraying, plating, CVD, PVD, hardfacing and so forth; based on the characteristic of coating processes including economic and operational conditions such as operating cost, operating conditions, equipment cost, to nature of the coatings such as the coating geometry, thickness, as well as aesthetics: adherence and surface finish. Attention was then drawn to the ‘Thermal spray coating’ technique, commonly referenced as the ‘Ugly duckling coatings’ given its nature, followed by discussion about the corresponding defects. Nevertheless, it was identified to also be functionally utilitarian.**

	Thermal Spray	Plating	CVD	PVD	Hardfacing	Ad + P	Ad + P + C
1. Operating cost	Low to moderate	Low to moderate	High	High	High	High	High
2. Equipment cost	Low to moderate	Low to moderate	High	High	High	High	High
3. Process environment	Low to moderate	Low to moderate	High	High	High	High	High
4. Coating geometry	Low to moderate	Low to moderate	High	High	High	High	High
5. Coating thickness	Low to moderate	Low to moderate	High	High	High	High	High
6. Substrate temperature	Low to moderate	Low to moderate	High	High	High	High	High
7. Adherence	Low to moderate	Low to moderate	High	High	High	High	High
8. Surface finish	Low to moderate	Low to moderate	High	High	High	High	High
9. Coating materials	Low to moderate	Low to moderate	High	High	High	High	High





**Workshop on “Frontiers in Materials” was jointly organized by ASMICC and Material Advantage Student Chapters of SRM Institute of Science and Technology (SRMIST), Kattankulathur and the National Institute of Technology, Tiruchirapalli (NITT). 14th August 2021 (Online) contd...**

An elaborate explanation of the thermal spray process: including powder injection, in-flight phenomena and impact with substrate was explained, followed by an emphasis on quality control requirements. Depending on the specific process conditions, ways of altering the extrinsic characteristics of the thin film (such as crack and fracture properties by altering the substrate impact) was discussed- with image evidence of ‘splats’ to support the same. The speaker then threw light on a study of defect taxonomy, followed by a slide explaining the microstructural artefacts and impact of processing tools on how it affects the material properties- such as the moduli, strength, corrosion, adhesion strength and so forth.

More insights on splat morphology, which is a direct function of extrinsic properties by resulting in a composite structure- with relevance to high entropy alloys were shared. Thin coatings and its desirability, and the entire synthesising process was elaborated upon followed by four case studies explaining the nuances of: thermal barrier coatings, liquid thermal spraying, adjustable microstructures and suspension feedstock for high velocity oxygen fuel. Lastly, given that numerous variables influence the thermal spraying process, a suggestion was made to short circuit the ‘valley of death’ and directly go from first to last step. The lecture concluded with a small note on ceramic biomaterial coatings.

**Lecture II: Materials and Manufacturing for Future Mobility  
Dr. M Sathya Prasad and Dr. S. Dhanasekaran, Ashok Leyland, Chennai**



The lecture began by addressing the pressing quandaries in the commercial vehicle industries like shortage of materials and fluctuating prices, need to re-invent /contrive innovations in the field, temporal and supplier-based variance in material properties, high dependence on supplier and non-availability of structural non-metals. The global trends in commercial vehicles, further delineated as IC-vehicles and E-vehicles were elucidated, with focus on the technology differentiating the same. More light was thrown on the future design and modelling opportunities - especially along the lines of design for recyclability and reusability integrating non-metal modelling over the conventional structural-metal modelling, and the complications offered by the same. A projection of the materials requisite over next 2 decades was drawn to identify the trends in the specific material consumptions, with a focus on the future steel technology supported by examples of various grades of steel and their corresponding applications. Aluminium alloys, especially extruded components and sheets with its increasing importance for commercial vehicles was discussed; carbon fibre technology; Bio plastics along with the challenges it engenders were discussed. The lecture concluded with recommendations suggesting the need for R&D to obviate technology and cost barriers, while at the same time be mindful of design aspects accommodating recyclability, reusability and complaint with future component designs.

**Future Steel Technology**

Weight structural and non-structural parts using UHSS and Generation Steels

Material	High Strength Steel	Ultra High Strength Steel Generation Steel
Weight Saving	-	~10 - 20%

**Benefits:**

- Weight Reduction
- Payload Carrying Capacity
- Crash Resistance
- Increased Safety & Performance

**Applications:**

- Load Body Floor Panels
- Door Structures
- Cab Floor Structure
- A Pillars
- Fuel Tank Bracket

**Constraints:**

- Impact

**Weight Constructions**

Hollow sections for structural application

Material	Steel Solid Construction	Steel Hollow Construction
Weight Saving	-	~30%

Material	Steel - Solid Sections	Steel - Hollow Sections
Yield Strength (MPa)	1050 (min)	700 (min)
Tensile Strength (MPa)	1250 (min)	840 (min)
% Elongation	8 (min)	8 (min)

**Applications:**

- Anti Roll Bar (Cab Suspension)
- Camshaft
- Axle Beam

**Challenges:**

- Technology not established for M&HCV

**Lecture III: India's Self-Sufficiency in Materials of the 21st Century  
Dr. Debashish Bhattacharjee, Tata Steel**



**Materials - search for local sources**

Strategic ores (overburdens) of Fe and Co

Indigenous ores

Overburden

Coal seams

Overburden

Electric vehicle

mining

**Future Mobility depends on light weight materials**

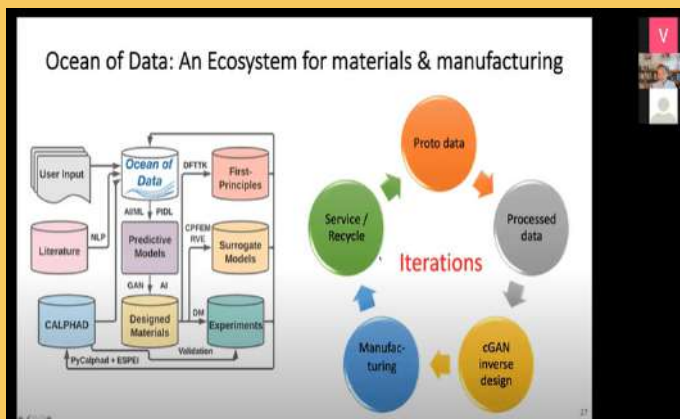
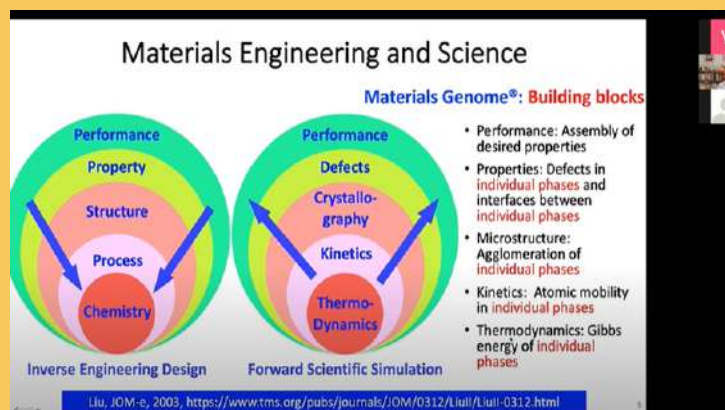
**Workshop on “Frontiers in Materials**  
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**National Institute of Technology, Tiruchirapalli (NITT).**  
**14th August 2021 (Online), contd...**

The lecture started with a mention of COVID-19 and its disruptive nature in society. Dr. Bhattacharjee spoke about how the pandemic has exposed the fragility of systems that we as a society have prided ourselves over, be it healthcare or the industry. He also highlighted the clear shift in nations and their mindsets spurred on by the pandemic: we need to be self-sufficient in critical, strategic materials, should such an event occur in the future. He started with medical materials. He highlighted examples of gloves, PPEs and hand wash chemicals, and even oxygen that became in short supply, how the world took a while to get to the point of self-sufficiency. As of now, 75% of all medical materials are imported (including instruments, therapeutics, implants and so on). The lecturer mentioned how even the most basic biomaterial - hydroxyapatite - is imported in India entirely. He pointed to the example of collagen and replacements for the same, talking about how this material is now being looked into in India's startup space, searching for cheaper sources for developing markets such as ours. He highlighted how it is important not just to create companies that work on medical materials, but also to ensure an ecosystem of innovation is nurtured in the country to ensure top quality self-reliance. Moving on to aerospace materials, he talked about how India, despite having the 3rd largest deposits of titanium in the world, accounts for less than 1% of its production. He talked about how titanium, being light-weight and corrosion-resistant, is perfectly suited to a wide variety of applications from aerospace to implant materials, thereby conferring it its prime importance. Finally, the lecture touched upon steel, mentioning how it is ubiquitous in our lives, yet not that sustainable in its production. He mentioned carbon capture, recycling and using hydrogen within the plant as examples for sustainability. In conclusion, the lecture reiterated the need for a policy-driven, collaborative, industry-academia led materials revolution in India, incorporating ingenuity and design thinking, moving the country towards self-sufficiency in the upcoming century.

**Designing and Tailoring Frontier Materials Processing and Properties**  
**Prof Zi-Kui Liu, Penn State University, USA & Former President, ASM International, USA**



The lecture started with the history of materials and their relation to civilization, talking about how, from the bronze age to today, materials have defined entire epochs. He then brought up the Cu-Sn phase diagram, stressing how just by pure trial and error, humans were able to find excellent alloys exhibiting toughness and strength, with no prior knowledge of the complex phase transformations taking place in the material. He spoke about how the phase diagram is based on thermodynamics, and how this complex diagram is able to provide a whole host of information regarding how one can process the material to get the desired phases and hence, desired properties. He then moved on to introduce the term “Materials 4.0”, talking about how digitization in today's age is also moving into the realm of materials discovery, processing and optimization, right from raw material to final product. He spoke about his Materials Genome Initiative, talking about the importance of data to building an infrastructure for this digitization, spurred on by ICME (Integrated Computational Materials Engineering). He then introduced the contrast between engineering inverse design (where the suitable performance material is investigated more deeply) and forward scientific simulation (where calculations are built from thermodynamics to predict the performance as required), to further understand ICME and its approaches. He stressed on a balance between science and engineering for good materials research. Finally, Prof. Zi-Kui Liu spoke in length about the importance of Material Advantage for budding professionals and students, talking about how only a motivated minority of driven individuals are members of the same, thereby outlining the vast array of benefits and successes that can be gained from a membership in the organisation. He also spoke about its tangible outcomes, no matter which domain one takes up in the future, be it in the industry or academia. His lecture proved to be a wonderful session of learning and motivation for all attendees.





**Workshop on “Frontiers in Materials**  
**was jointly organized by ASMICC and Material Advantage Student**  
**Chapters of SRM Institute of Science and Technology (SRMIST),**  
**Kattankulathur and the National Institute of Technology,**  
**Tiruchirapalli (NITT).**  
**14th August 2021 (Online), contd...**

**Concluding Session**  
**Dr. U. Kamachi Mudali,**  
**Trustee-Elect, ASM**  
**International, USA**



As the workshop drew to an end, Dr. U. Kamachi Mudali thanked the eminent speakers and all the members in attendance. Dr. Mudali highlighted the importance and the significance of having a workshop on understanding where the world of materials is currently at, and the progress that brought us here, on the eve of India's 75th Independence Day.

Dr. Mudali then summarised the spectrum of talks delivered throughout the day. He expressed his gratitude to Prof. Berndt for his enlightening and in-depth talk on Thermal Spray techniques and applications. Dr. Mudali praised Dr. Sathyaprasad and Dr. Dhanasekaran for their talk on “Materials and Manufacturing for Future Mobility” and a unique and synergistic delivery that indulged the audience's attention throughout the hour, as well as their valuable inputs on the history, current market and the future of electric vehicles. Dr. Mudali expressed his thanks to Dr. Debashish Bhattacharjee for spanning a huge breadth of new classes of materials of and for the 21st century. Dr. Mudali gave his utmost thanks to Dr. Zi-Kui Liu for joining us and delivering a talk on “Designing and Tailoring Frontier Materials Processing and Properties, despite the time difference. He highlighted the importance of handling the Ocean of Data and lauded Dr. Liu's passion for it.

Dr. Mudali also expressed his gratitude to Dr. Zi-Kui Liu for emphasizing the advantages and the import of a society like the ASM International. Dr. Mudali conveyed his special thanks to Prof. Ravi Ravindran and Dr. Debbie Aliya for joining us in the event and for their constant support throughout, and the Material Advantage Chapters at SRMIST and NIT Trichy for organizing the workshop.

After a streak of enlightening talks the workshop on “Frontiers in Materials” came to an end with the vote of thanks delivered by Dr. V. Karthik, Faculty Advisor, Materials Advantage Student Chapter, NIT Tiruchirappalli who voiced his thanks to all the speakers of the workshop, and all the esteemed guests, organizers and members for the making of an exemplary workshop.

## Snippets



**Farewell to Dr. Shubrajit**  
**Bhaumik on behalf of**  
**ASMICC on his relocation to a**  
**new position**



**New member introduction -**  
**Sengoda Gounder & Sons, Chennai**



**New member**  
**introduction**  
**Chennai**

**Reports on the Inauguration of ASM Material Advantage  
Student Chapters at  
Sri Sivasubramaniya Nadar College of Engineering,  
Chennai  
Anna University, Chennai  
VIT BHOPAL UNIVERSITY**



**ASM Material Advantage Student Chapter Inauguration  
Sri Sivasubramaniya Nadar (SSN) College of Engineering, Chennai**

The ASM students' chapter was inaugurated on 23rd April, 2022 in online mode. The function started with an invocation by students. Dr. D. Ananthapadmanaban, Faculty Advisor welcomed the delegates and spoke about the process leading up to the inauguration. Dr. Ve. Annamalai, Principal, spoke about the challenges of starting and then sustaining the ASM chapter. Dr. Radha, Vice Principal, shared her experiences of starting a student's chapter and elucidated the benefits that she personally saw after the inauguration of student's chapter, IEEE. Dr. K.S. Vijay Sekar, HOD Mechanical, spoke about Industry-Institute interaction and how ASM could play a major role in networking for research benefits. Dr. Kamachi Mudali, Trustee ASM International USA and Dr. Kamaraj, Professor, IITM recalled their experiences with other chapters and urged the students to interact with other chapters. They also highlighted the various benefits like obtaining simultaneous membership into ASM, AISI, CS and MME, which are four of the most prestigious professional associations in the USA. One could also access their websites and participate in a plethora of programmes conducted throughout the year. Mr. Srinivasan, Divisional Manager, Ashok Leyland, who was the initiator of this chapter spoke about his visits to SSN and fondly recalled his interactions with faculty and expressed confidence that this chapter will go far in the years to come. Dr. Santosh, Assistant Professor proposed the vote of thanks. The inaugural event was followed by a technical talk on Potential of Magnesium based composites in transportation by Dr. Sushanta Kumar Panigrahi, IITM, which was well received and invigorating. The ASM chapter has been started with 30 students till date and we certainly hope that they will grow in the future.



**Rishab Rajesh  
Chair**



**Mohamed Akmal  
Baig Vice-Chair**



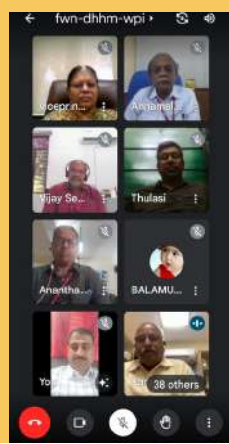
**R. Vignesh  
Treasurer**



**Dr. Ananthapadmanaban  
Faculty advisors**



**Dr. Santosh  
Faculty advisors**



Potential of Engineered Magnesium based  
Alloys and Composites in Transportation  
Sector: Research to Application



23<sup>rd</sup> April 2022  
Inaugural Event of  
ASM Material Advantage Student Chapter  
SSN College of Engineering, Chennai



**Vaitheeswaran  
Secretary**





# ASM Material Advantage Student Chapter Inauguration at VIT Bhopal University, Madhya Pradesh, India

The Inaugural function of MA Chapter at VIT Bhopal University, Kothrikalan, Sehore, Madhya Pradesh State of India was held through Online mode on 2nd of May, 2022 from 6.30 PM to 8.00 PM. Around 140 students along with 9 dignitaries participated in the event. The Chief Guest of the event was Mr. Pradeep Goyal, Chairman and MD of Pradeep Materials Pvt. Mumbai. The Chapter has 107 student members and is one of the biggest Material Advantage Chapters in India. The inauguration was organized under the leadership of Honourable Vice Chancellor Dr. U. Kamachi Mudali who is also Trustee of Board of ASM International, USA. The event had the blessings of Honourable Chancellor Dr. G. Viswanathan, Vice President Shri Sankar Viswanathan and Assistant Vice President Ms. Kadhambari S. Viswanathan. The Faculty Advisor Dr. Balaguru Sethuraman formally welcomed all the dignitaries in his address and greeted all the guests who have joined the event. The inauguration started off by virtual lighting of the lamp, and virtual greetings to all the dignitaries with flowers followed by an informative video on VIT Bhopal University. Mr. Anurag Gadgil, Chair of the MA Chapter discussed the Annual Plan of the MA Chapter of VIT Bhopal for 2022-2023.



**Address by the  
Chief Guest**



**Address by  
Prof. Ravi Ravindran**





The Management, Faculty, and Staff of VIT Bhopal University Cordially invite you to the

**INAUGURAL FUNCTION OF**  
*Student Chapter*  
**MATERIAL ADVANTAGE**  
VIT Bhopal University

Chief Guest  
**Mr. Pradeep Goyal**  
Chairman & MD, Pradeep Metals Ltd., Mumbai

**Ms. Kadhambari S. Viswanathan**  
Assistant Vice President, VIT Bhopal University, will preside

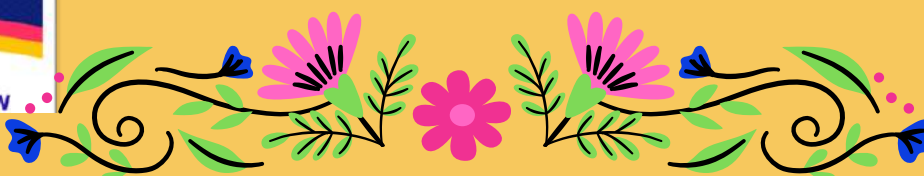
Felicitation Address by Guests of Honour

<b>Dr. Judith Todd</b> President, ASM International	<b>Dr. U. Kamachi Mudali</b> Trustee, ASM International
<b>Dr. David Williams</b> Vice President, ASM International	<b>Mr. Ashok Tiwari</b> Chairman, ASM India Council
<b>Prof. Ravi Ravindran</b> Past President, ASM International	<b>Prof. M. Kamaraj</b> Chairman, ASM Chennai
<b>Dr. Navin Manjooran</b> Trustee, ASM International	<b>Shri N. Sampathkumar</b> Vice Chairman, ASM Chennai

**Date:** 2<sup>nd</sup> May 2022 (Monday)  
**Time:** 6:30 PM – 8:30 PM

**Link:** <https://tinyurl.com/VITBHO-MA>  
**ID:** 961 5407 9914  
**Passcode:** 742604

**VIT Bhopal University**  
Bhopal-Indore Highway, Kothrikalan, Sehore, Madhya Pradesh, India  
**VIT- A PLACE TO LEARN, A CHANCE TO GROW**



The inaugural function was graced by Dr. Judith Todd, President, ASM International and P.B. Breneman Chair and Professor of Engineering Science and Mechanics, The Pennsylvania State University, USA. The Vice President of ASM International Dr. Dave Williams, - Professor of Materials Science and Engineering, The Ohio State University, USA, delivered his felicitation address. The other Guests of Honour who delivered their address were: Prof. Ravi Ravindran, former President of ASM International – Professor of Advanced Materials at Toronto Metropolitan University, Canada; Dr. Navin J. Manjooran, Trustee, Board of ASM International and Chairman, Solve Technology and Research, Inc., Orlando, USA; and, Chair of India Council of ASM International Dr. Ashok Tiwari, Chairman, CHEMI-CHEM Industries, Mumbai. Dr. U. Kamachi Mudali, Trustee, ASM International and Vice Chancellor of VIT Bhopal University, Prof. M. Kamaraj, Chairman ASM Chennai Chapter and Shri N. Sampathkumar, Vice Chairman, ASM Chennai Chapter also felicitated the MA Chapter during the event.

The Chief Guest, Mr. Pradeep Goyal, Chairman and MD of Pradeep Materials Pvt. Ltd. Mumbai, delivered an informative address. He inaugurated the website of the MA Chapter through the Web Coordinator Mr. Saksham Kathuria. All the dignitaries blessed the event with their wisdom and shared their knowledge, making it a memorable one. The entire event was compered by Ms. Lavanya Basera, Secretary and Ms. Akshita Kumar, Vice Chair of the Chapter. Finally, Mr. Surya Murali, Treasurer delivered a vote of thanks. A group photo was captured for the remembrance of the successful event.



**Faculty Advisor**  
**Dr. Balaguru Sethuraman,**  
Dean (i/c) and Senior  
Associate Professor  
School of Mechanical  
Engineering (SMEC)



**Chair:**  
**Mr. Anurag Gadgil,**  
III year Mechanical Engg.



**Vice Chair:**  
**Ms. Akshita Kumar,**  
II-year Aerospace  
Engg.



**Secretary:**  
**Ms. Lavanya Basera,**  
I year Mech Engg. AI  
and Robotics



**Media & PR  
Coordinator:**  
**Mr. Mohi Dharmani,**  
II year Aerospace Engg.



**Treasurer:**  
**Mr. Surya Murali,**  
III year Mechanical Engg.



**Spokesperson:**  
**Mr. Shri Hari Satheesh,**  
II year Aerospace Engg.



**Event Coordinator: Mr.**  
**Yogesh Kadam,**  
II year Aerospace Engg.



**Website Coordinator:**  
**Mr. Saksham Kathuria,**  
I year AI & Machine  
Learning





**The Department of Mechanical Engineering, College of Engineering Guindy, Anna University inaugurated the 'Anna University Material Advantage Student Chapter' on 29th April 2022 at 2: 30 p.m. in the Henry Maudslay Hall, DME, CEG, Anna University. A total of 31 student members are there at present in the Student chapter.**

**The inaugural ceremony commenced with the lighting of lamp by a group of dignitaries, Prof.Dr.L.Suganthi (Dean, College of Engineering, Guindy), Prof.Dr.M.Kamaraj (Chairman ASM International, Chennai Chapter), Mr.N.Sampathkumar (Vice chairman, ASM International, Chennai Chapter), Prof.Dr. Sushanta Kumar Panigrahi (Joint Secretary, ASM International, Chennai Chapter), Prof.Dr.Srinivasa Rao Bakshi( Associate Professor, MME, IITM), Dr. S. Balasivanandha Prabu, (Professor and Head, Department of Mechanical Engineering, CEG, Anna University). The function was graced by the presence of the Executive members of ASM International Chapter, Professors, Office bearers of the Student chapter and Student members, and other UG and PG students of the Department of Mechanical Engineering.**



**Dr.J.Sudha**  
**Faculty Advisor**



**Mr.P.Pradeeprajan**  
**Chair**



**Mr.V.S.Rohith**  
**Vice Chair**



**Mr.S.Naveen Rajkumar**  
**Secretary**



**Ms.G.Padmini**  
**Treasurer**



**The event started with the singing of Tamil Thai Vaazhthu. The Head of the Department welcomed the gathering. Dean, CEG delivered the presidential address with a motivational talk. The Chief Guest of the day, Prof.Dr.M. Kamaraj inaugurated the Student Chapter highlighting the benefits of the student chapter and the avenues for Student members. Mr. N. Sampathkumar explained in detail the MA chapter and the advantages of joining the chapter. Dr. Srinivasa Rao Bakshi read the felicitation note given by Dr. U. Kamachi Mudali and he also addressed the students. Dr. J. Sudha, Faculty Advisor for the Student Chapter enumerated the upcoming programmes and the events to be conducted in this Academic year. Dr. Sushanta Kumar Panigrahi gave the keynote address on the topic “Potential of magnesium-based alloys and composites in the transportation sector: fundamentals to research”. The Inaugural function ended with the Vote of thanks delivered by Mr.P.Pradeeprajan. Chair, Anna University Material Advantage Student Chapter.**



**"Platinum Jubilee Independence Day  
Special Lecture on  
"PLATINUM JUBILEE & BEYOND:  
MATERIALS DEMAND AND ISSUES"  
was organized by ASM International  
Chennai Chapter on the special occasion  
of 75th Independence day of India**

## SPEAKER DETAILS

### DR. U. KAMACHI MUDALI

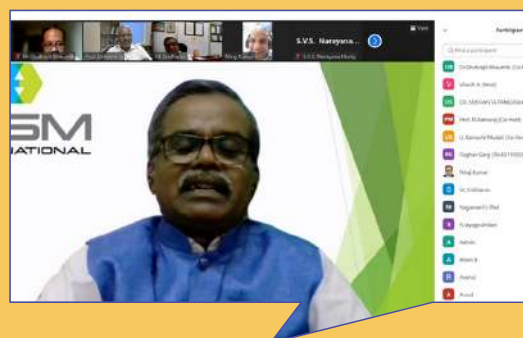
FNAE, FIIM, FNASC., FIICHE, FNACE, FASM, FAPAM,  
FIE, HFECs, HMUCTAA, HHIM, FASCH, FICS;  
VICE-CHANCELLOR, VIT BHOPAL UNIVERSITY &  
HONORARY PROFESSOR OF PRACTICE, IIT MADRAS;  
FORMERLY, DISTINGUISHED SCIENTIST,  
DEPARTMENT OF ATOMIC ENERGY;  
CHAIRMAN & CHIEF EXECUTIVE, HEAVY WATER  
BOARD (HWB), MUMBAI




Platinum Jubilee Independence Day  
Special Lecture on  
**"PLATINUM JUBILEE & BEYOND:  
MATERIALS DEMAND AND ISSUES"**  
**DATE : 15TH AUGUST 2021**  
**TIME : 11:00 AM - 12:30 PM (IST)**



**Platinum Jubilee & beyond:  
Materials Demand and issues**  
U. Kamachi Mudali  
Vice Chancellor, VIT Bhopal University &  
Trustee Elect, ASM International, USA  
Former President, Indian Institute of Metals



India celebrated its 75th Independence day this year in a grand manner. On this memorable day, Dr. U. Kamachi Mudali, Trustee-Elect, ASM International, USA, delivered the Independence Day Special Lecture on "Platinum Jubilee and Beyond: Materials Demand and Issues" to the Indian materials community on 15th August at 11.00 hrs. Prof. M. Kamaraj, Chairman ASMICC welcomed the august gathering of over 120 participants. Prof. Kamaraj reminded all of us about the ultimate sacrifices of our freedom fighters for which we all will be ever grateful. Prof. Kamaraj introduced the esteemed speaker Dr. U. Kamachi Mudali, who then journeyed us through various stages of historical route of material science, engineering and technology development in India. Prof. U. Kamachi stressed upon the need of the hour for self-dependency "Atmanirbhar Bharat". India has been strong in metallurgy for 1000's of years. Dr. U. Kamachi's lecture highlighted all such magnificent inventions from the rich Indian history, such as diamond, silk, the Dancing Girl Mohenjodaro (2500 BC), Wootz Steel (300 BC), Delhi Iron Pillar (AD 400), Zinc Extraction (AD 1200), Chola Bronze Icons (AD 1200), Kerala Bronze Mirrors (AD 1600) etc.

The co-existence of technologies, culture and heritage in Indian history discussed by Dr. U. Kamachi mesmerised the audience and made them proud as one of the most culture rich country. The "Lost Wax Process" – an age old bronze casting methodology was shown to the participants, indicating India's strength on the metallurgical process since ages in India. A detailed report on the "Rustless Wonder – the Delhi Iron Pillar" was also presented during the lecture highlighting insignificant amount of corrosion even after 1700 years. Then came another wonder, the Wootz Steel having high stable microstructure – which indicated the eminence of Indian Metallurgists centuries ago. Dr. Kamachi also stressed upon the "Total Material Requirement" in Global level indicating the importance of steel, aluminium, rare earth materials, copper and nickel. The story of development of Steel was eye-catching for all the participants. Dr. U. Kamachi presented the evolution of alloy steel and stainless steel and exhibited India's strength in developing crude steel. Dr. U. Kamachi made the audience aware of the various Government policies such as National Steel Policy 2017 and Steel Cluster Policy, which Government has initiated for steel production and consumption. He made the audience aware of the Rural Steel Consumption policy of Government of India, which was appreciated by all the participants. Dr. U. Kamachi also showed the participants how India is growing in the export of steel and the second position of India in the Global market. The growth of stainless steel per capita was also highlighted by Dr. U. Kamachi. Additionally, the aluminium growth in India was highlighted by him. He also highlighted the various applications of aluminium with high end aluminium alloys. Dr. U. Kamachi also projected the growth of copper industry in India and the value addition of copper towards recycling process. Dr. Kamachi projected a perfect picture of the growth of Indian metallurgy as compared to the advanced countries. Dr. U. Kamachi's lecture highlighted an important aspect that we (India) must be self-dependent in assimilating and developing high end technologies to advance in the field of material science and engineering. Dr. U. Kamachi's lecture was an eye opener for all the participants, everyone expressed their enthusiastic comments and said that the lecture was the best gift given to them by ASM International Chennai Chapter on the 75th Independence Day of India.

Dr. Shushanta Kumar Panigrahi, Jt. Secretary ASMICC, thanked the august gathering of participants for attending the program. He also expressed his gratitude to the management of SRM Institute of Science and Technology who has provided the online platform for both days. A special thanks to Dr. A. Vinoth, SRMIST, Dr. V. Karthick, NIT Trichy and Dr. Shubrajit Bhaumik, ASMICC for their support in arranging the lecture. The session ended with a positive energy by all the participants cherishing the moments of 75th Independence Day.

# ASM Material Advantage Student Chapter Sri Sivasubramaniya Nadar (SSN) College of Engineering, Chennai - Lecture Highlights

## Potential of Engineered Magnesium based Alloys and Composites in Transportation Sector: Research to Application

Dr. SUSHANTA KUMAR PANIGRAHI



23<sup>rd</sup> April 2022  
Inaugural Event of  
ASM Material Advantage Student Chapter  
SSN College of Engineering, Chennai



## Potential of Engineered Magnesium based Alloys and Composites in Transportation Sector: Research to Application

**Dr. SUSHANTA KUMAR PANIGRAHI**



23<sup>rd</sup> April 2022  
Inaugural Event of  
ASM Material Advantage Student Chapter  
SSN College of Engineering, Chennai

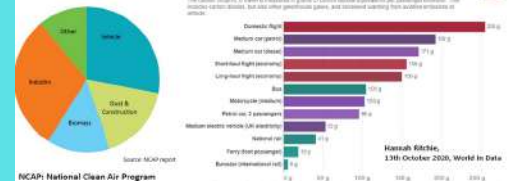
### Current Application of Magnesium based Alloys and Composites in Mobility Sector:

- **Road:** Automobiles
- **Air:** Aerospace
- **Water:** Marine



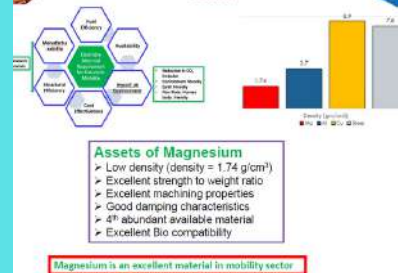
### Sources of CO<sub>2</sub> Emission

**Carbon footprint of travel per kilometer, 2018**  
The carbon footprint of travel is measured in grams of carbon dioxide equivalents per passenger kilometer. This includes carbon dioxide, but also other greenhouse gases, and increased warming from aviation emissions at altitude.



**Dr. Sushanta Kumar Panigrahi**  
**Associate Professor**  
**Department of Mechanical Engineering**  
**Indian Institute of Technology Madras, Chennai**  
**600 036, India**  
**skpanigrahi@iitm.ac.in**

### Potential of Magnesium in Transportation Sector



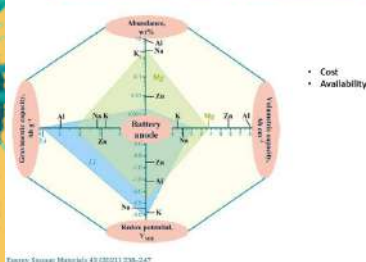
## Composites: Present and Future

Dr. SUSHANTA KUMAR PANIGRAHI



30<sup>th</sup> April 2022  
Inaugural Event of  
ASM Material Advantage Student Chapter  
College of Engineering, Guindy

## Li-Ion Batteries Vs. Mg-Air Batteries



## Outline of my Presentation

- Fundamentals of Mg based alloys and composites
- Present and future potential of Mg in:
  - Transportation Sector
  - Medical Sector
  - Battery Sector



- Battery Technology



### Funding Agencies

Engineering, Guindy College of Engineering, Anna University

- Funding Agencies**
- IITM-IC&SR NPSC Proposals
  - DSR & MHRD
  - DST-AMT
  - DST-FIST
- Research Scholars**
- Dr. Biranchi Narayan Sah
  - Dr. Fazeela Khan
  - Mr. Sushanta Kumar Sah
  - Mr. Rakesh Kumar
  - Mr. Gourav





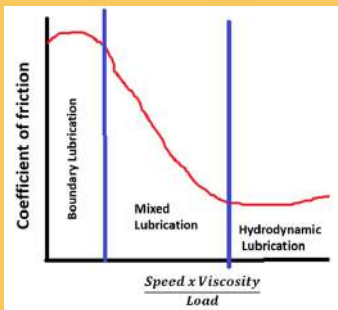
# Technical Articles

## Lubricating Industrial Pastes: composition, types and applications Dr.Shubrajit Bhaumik

### 1. Introduction:

To enhance the durability of the machine components selection of correct type of lubricants is most important. The most commonly used lubricant “greases” are used in case of high-friction moving tribo-pairs, however for applications involving high-pressure with low speed, or oscillating speed or presence of high temperature (say more than 300 deg Celsius) and applications which are exposed to fretting wear and fretting corrosion resulting in seizure, industrial pastes are highly recommended. Industrial pastes provide a clean lubrication and can be used for applications subjected to temperatures -70 °C to 1400°C in corrosive environment. Industrial Pastes contains over 10% (almost 40%) solid lubricants in carrier oils while greases contain 5-10% additives [1].

Industrial Pastes forms a pressure resistant solid film preventing sticking and fretting corrosion. The presence of advanced solid lubricants and additives ensures continuous lubrication and pressure resistance even at extremely low/high temperatures and corrosive environment. The coefficient of frictions remains unchanged in area of oiled bolts, even after several bolt re-tightening and loosening processes and results in non-destructive dismantling, even after long use at high temperatures.



**Figure 1. A typical Stribeck Curve showing the regimes of lubrication**

Figure 1 shows a typical Stribeck curve [2] which indicates the formation of a lubricating film depends on speed. At low speeds, the frictional coefficient is quite high indicating the incapability of the lubricating oils and greases to provide a lubricating film between the two mating pairs. This is known as boundary lubrication regime. As the speed increases, a lubricating film is formed, however there remains the contact between the asperities (roughness peaks) of the mating pairs, indicating a mixed lubrication regime. Most engineering applications are in mixed lubrication regime. It is only at a very high speed the mating pairs are fully separated by the lubricant and this is the hydrodynamic lubrication regime. Industrial Pastes exhibit their significant performance in controlling the friction and wear in mixed lubrication regime, thus protecting the machine elements, and increasing the breakdown intervals.

Thus, using the correct grade of Industrial Paste will:

- Provide a constant coefficient of friction enabling proper preload and torque specifications.
- Provide superior load carrying capacity
- Resist friction and wear of components
- Prevent stick slip and seizure
- Provide excellent corrosion protection
- Provide easy non-destructive dismantling for applications even at high temperatures.
- Cater wide range of temperature application (-70 °C to 1400°C)

### 1. Classification of Industrial Paste:

Pastes contain several types of solid lubricants such as graphite, molybdenum di sulphide, copper, aluminium, ceramic particles in carrier oils such as mineral oils, polyalphaolefins, silicone etc. These pastes can be used as assembly paste, disassembly paste without any damage, running-in paste and continuous lubricating paste.

i. White paste: These pastes contain various white solid lubricants in various percentages along with the carrier oil. These solid lubricants act as adhesive protective layers when subjected to high pressure such as the threaded bolts in assembly in steel – steel, copper and aluminium alloys.

ii. Black paste: Black pastes contain mainly of graphite and molybdenum di sulphide. Due to the layered structure of graphite and molybdenum di sulphide they provide a good tribo film between the mating pairs. These pastes are generally used in places where the torque and forces are needed to keep to low values and hence, are generally used as assembly pastes.

iii. Pastes with metal content: Pastes containing metal particles as solid additives, mostly copper ensures favorable frictional values and a high separating effect on frictional contacts, that are free from lead and nickel. In applications which are exposed to 300 deg C, usage of copper pastes are recommended. At 300 deg C the oil from the grease evaporates leading to an unwanted situation of negligible lubrication. Copper, whose melting point is more than 1000 deg C is an ideal solution for such application. In several composition of metal pastes, they contain graphite and molybdenum and appear like black pastes.

# **Lubricating Industrial Pastes: composition, types and applications**

## **Dr.Shubrajit Bhaumik**

i. Perfluorinated pastes: PTFE (polytetrafluoroethylene) solid additives in perfluorinated oils, are chemically inert and is mostly used in aggressive environment subjected to corrosion. However, the manufacturing of these pastes is expensive and hence, is to be used with concern.

ii. Micro Ceramic pastes: Micro Ceramic pastes can resist temperature up to 1400 deg C. The unique combination of the carrier oil with Micro Ceramic additives makes it suitable for all applications including high temperature and corrosion resistant.

iii. Silicone pastes: Silicone pastes contains suitable solid lubricants in silicone oil. These pastes are used for lifelong lubrication such as the valves supplying gases, water etc. Also, they are used for lubricating plastic mating pairs which requires lifetime lubricant.

### **1. How does an Industrial Paste work?**

Greases which are most used lubricants are made of a thickener, base oil and additive. Greases are used between high friction moving pairs while pastes are used between low friction pairs or mostly static pairs. The additive content in a grease is 5%- 10%. At 250 deg C - 300 deg C where most greases lose their lubricity due to the evaporation of the carrier oils and become hard (known as grease dry out [3] ), and thus, the additives present in the grease will not be able to provide the lubrication, leading to failure of applications due to inadequate lubrication. Industrial pastes are used in such demanding situations where the temperature is high. The high content of additives in Industrial Pastes will act as solid lubricant between the mating pairs and will be able to maintain a separation between the two mating pairs to avoid high temperature damages. Industrial pastes such as the assembly pastes are also recommended for various assembly both for ambient and high temperature as the solid lubricants helps in reducing the applied torque and force and preventing the damages caused due to stick slip.

Industrial pastes help in maintaining a constant frictional coefficient particularly in oscillatory movement where the speed is never constant. In an oscillatory movement, there will always be a high speed which will even be zero and hence, frictional values change frequently between the boundary lubrication regime and mixed lubrication regime (as indicated in the Stribeck Curve, Figure 1). Under such harsh conditions when the friction between the two mating pairs is not constant, the conventional greases cannot perform in providing a sufficient lubricating film and hence, pastes are highly recommended.

### **4. Few Applications of Industrial pastes**

Industrial Pastes are highly recommended in all process industries such as steel industry, cement industry, paper and pulp industry, oil and gas etc. Few of the applications (but not limited to) are [4]: Screw connections, e.g all assemblies requiring dismantling such as valves, turbines, exhaust pipes, tooth wheels, chains, slide paths and shafts, engine heads, exhaust manifolds, leaf spring, low speed chains (crawler tracks), ball joints etc.

- Furnace car bearings, journals and flanges
- Chucks and machine glides
- Screw connections in aggressive environments e.g acid vapors and alkaline solution, turbine bolts and corrosive environment.
- Valves and seals when aggressive media act on lubrication point
- Plug tools and bushings



**Figure 2 Application of paste in valves**

### **1. Conclusion:**

Lubrication is the blood of any equipment and hence, selecting the correct type lubricant and using a good quality of lubricant are important factors to reduce the breakdowns of machineries. At low speeds due to the absence of stable lubricating films, the metal tribo pairs meet each other which results in scuffing. Industrial pastes are excellent solutions to prevent failures even at high temperatures (1400 deg C) and corrosive environment. These pastes form a pressure resistant films thus, preventing stick-slip and seizure. It is to be noted that too much lubrication is harmful for any equipment and hence, an optimum amount and correct type of lubricant should always be applied to all equipments.

### **References:**

1. Mang, T (2014), Encyclopedia of Lubricants and Lubrication. Berlin Germany. Springer.
2. Batchelor, A., Stachowiak, G. (1993). Engineering tribology. Netherlands. Elsevier Science.
3. [www.machinerylubrication.com](http://www.machinerylubrication.com)
4. [www.wagner-german-oil.com](http://www.wagner-german-oil.com)

### **About the Author:**

Dr. Shubrajit Bhaumik a Mechanical Engineer who has been working in the area of tribology for past 15 years. He has published several scientific articles in reputed journals of tribology and has also a patent to his credit. He is closely working with several industries towards reducing their failures due to lubrication. Dr. Bhaumik earned several recognition in the field of tribology and have published several articles in reputed journal of tribology. He is also the reviewer of reputed Tribology Journals. He is a life member of Tribology Society of India, Malaysian Tribology Council and ASM International Chennai Chapter. Presently, Dr. Bhaumik is the Secretary of ASM International Chennai Chapter. He can be reached at [shubrajit.projects@gmail.com](mailto:shubrajit.projects@gmail.com)





**Recent Trends on Mg-alloys****Saurav Mishra<sup>1</sup>, Rakesh Kumar<sup>1</sup>, Sushanta Ku Panigrahi<sup>1\*</sup>****<sup>1</sup>\*skpanigrahi@iitm.ac.in****<sup>1</sup>Department of Mechanical Engineering****<sup>1</sup>Indian Institute of Technology Madras, Chennai, India**

We live in a fast-growing world with evolving technologies. If we go down through the memory lane of human experiences around the mid-20th century, we find the consumer products like TV, computers etc to be very bulky with restricted mobility. Coming to the current age where these products have evolved into a much lighter version with superior degree of portability. This trend of light weighting led to the steep demand of low-density structural materials across every industrial sectors. Owing to this surge in demand, Magnesium (Mg) alloys became one of the most promising alternative materials for the industries including aerospace, automotive, electronics, sports and biomedical. The market demand of magnesium alloys can be visualized by the pie-chart below.



**Figure: Various applications of Mg alloys (Left) and Market demand of Mg alloys (Right)**

Due to its lightweight properties, Mg alloys have become a go-to choice for several electronic components such as laptop casings, camera chassis, and smartphones. This is mainly because of improved thermal conductivity which Mg alloys offer when compared to other counterparts such as plastic and polymer-based casings. For example, AZ91D Mg alloy has been used in Nikon D780, giving it a superior dust and water-resistant properties needed for elite photography. Similarly, Magnesium – Aluminium alloys are used in high performance laptops such as HP Dragonfly; Dynabook Portege x30; Acer Swift etc.

When compared to other lightweight counterparts, Mg possess the least density (2/3rd of Aluminium and 1/4th of Steel) and a higher specific strength, stiffness and vibration damping capabilities. These properties have made Mg alloys suitable to be used in certain aerospace applications such as thrust reversers (in Boeing 747, 757, 767), helicopter transmission casings and in Military aircrafts such as Eurofighter Typhoon, Tornado and F16. Cast Magnesium Alloys such as AM60, AM50 have been widely used in automotive industries such as seat frames in Daimler Benz, instrument panels in Audi cars, engine blocks in Porsche 911 etc. Particularly, MA14 and ZK60 Mg alloys are widely used in alloy wheels by leading car manufacturers including Jaguar, Hyundai, Benz, BMW and racing cars.

Mg alloys have been proved and established as the next generation biomaterials and bio implants. The inherent bone-like mechanical properties complemented by their natural degradability, good biocompatibility and osteopromotive properties make Mg alloys an excellent choice for the biomedical industry. Even though the domain of Mg application is not fully explored till date, its potential has already been realized by the industries. We can expect Mg alloys to emerge as a favourite futuristic material for upcoming generations with more developments coming as a persistent advancement in the magnesium technology.

**BIO DEGRADABLE LUBRICANTS : Concern towards GREEN Earth by Dr.Shubrajit Bhaumik**

The concept of lubrication dates back during B.C (late 1850s) where the Egyptians used vegetable oils particularly the olive oils to move large and heavy objects. Animal fats were also used extensively a lubricant. The first oil well was first drilled in 1859 in Titusville,PA. With the expansion of auto industry, different types of lubricants were introduced to meet the market demands. Gradually, the quality and performance of the lubricants were improved resulting in aviation oils and lubricants. The modern day lubricants have to protect the equipment from overloading conditions and harsh operating conditions. With this advancement of technology the demand of lubricants also increased. The lubricant giants mainly focussed on the synthetic lubricants, however, in recent years the effects of lubricants on environment have been in focus, because the breakdown products of the synthetic lubricants affects the environment. Thus, the usage of environment friendly lubricants in industrial application is the need of hour.

Presently, there are five significant lubricant base stocks:

- Highly unsaturated or high oleic vegetable oils (HOVOs) : Primarily recommended for applications which are exposed to environment where toxicity is of primary concern, such as saw mill blades, ambient temperature chain drives, small gear boxes etc.
- Low viscosity polyalphaolefins (PAOs): Finds their application in several industrial applications particularly the gear boxes due to their excellent tribological properties.
- Polyalkylene glycols (PAGs): Suitable for industrial gear boxes
- Dibasic acid esters (DEs): Recommended for compressors and turbines
- Polyol esters (PEs)

**What are biodegradable lubricants?**

According to sources [1], biodegradable lubricants can be categorized into readily bio degradable (60% biodegradable in 28 days) and inherently biodegradable (biodegrades 20% within 28 days). Lubricants which are biodegradable must meet ISO 9439 or OECD 301B standards.

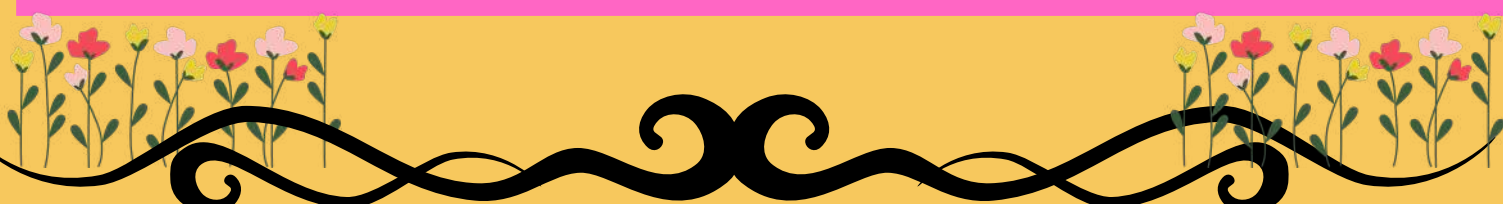
Due to strict regulations from government and increasing awareness of using environment friendly lubricants, the lubricant manufacturers are facing challenges in meeting the demands of industries. However, it is still yet in discussion that whether the concept of biodegradable lubricants is still realistic and cost effective. In Western Europe formulations containing 50:50 (ester:PAO) are being used for gasoline engine oils [2].

The vegetable oil based lubricants are being introduced due to their ease of availability and non-toxicity. Genetically engineering vegetable oils are also being used as lubricant base stock. Researchers have reported the superior tribological properties of various vegetable oils [3]. over conventional lubricants. Rape seed oil, canola oil, castor oil, sunflower oil etc are few of the most commonly reported oils with excellent tribological properties. Diesters are technically a good choice for biodegradable lubricant, but they are expensive, hence, synthetic esters and vegetable oils are being used. It has been seen that a combination of synthetic ester and lithium calcium thickener has shown better results in terms of various tribological properties including corrosion resistance [4]. Vegetable oils are not expensive but due to their poor oxidation properties they are not being used in large quantities for industrial applications, however genetically modified vegetable oils are now being used as base stocks.

**Problems faced by the manufacturers in producing the biodegradable lubricants:**

Concern about the environments is now the primary focus for all Governments, hence the equipment manufacturers are looking forward towards bio-degradable and environment friendly solutions. But its is not easy for the manufacturers to produce the biodegradable lubricants meeting similar standards as the present non-biodegradable industrial lubricants. Several researchers are working towards this common goal of achieving environment friendly lubricants with comparable properties as those of the present industrial lubricants.

Though the research on vegetable oils have shown promising results but all vegetable oils can not be used for industrial applications. Though it is difficult to predict as how much the replacement of mineral oil and synthetic oils with genetically modified vegetable oils-based lubricants, but at least 30% replacement might be possible within next few years [2]. Research on rape seed oil, castor oil, palm oils have shown promising results [3] but still the problem of thermo-oxidative stability of the vegetable oils need to be focussed.





**BIO DEGRADABLE LUBRICANTS : Concern towards GREEN Earth.**

The other challenge faced by the manufacturers is the source of the vegetable oils. Due to varied climate conditions the nature of the vegetable oils also changes and hence, getting an uniform composition with similar physico-chemical properties may not be always possible in several situations.

Several manufacturers blends PAO with diesters making them biodegradable to a large extent. These blends also exhibits good solubility, lesser oxidation properties and a good temperature – viscosity relationship. Also the blend of canola oil with diesters is common. The choice of the blend depends on the type of application and recyclability.

**Applications of biodegradable lubricants:**

Even with the challenges the lubricant manufacturers and researchers have identified several applications where products derived from vegetable oils are being used: Transmission hydraulic fluid, Industrial hydraulic fluids for process and machinery, Metal working oils and coolants, Food grade coolants, Chainsaw bar oil, Gear lubricants, Greases [2]. Biodegradable greases (based on lithium calcium thickener) are also available for applications where steel on steel contact is present such as agriculture and forestry equipments, construction and earthmoving equipments, mining and conveying equipments, water treatment and irrigation, reservoirs, bridges, etc [4,5].

Reported results [2] on usage of vegetable oils particularly soybean oil can be seen under the names BioSOY™, a patented electrical transformer fluid named BioTRANSTM, chainsaw bar oil called SoyLINK™, a rail curve lubricant called SoyTrak™, and Soy TRUCK™, a semi truck fifth-wheel grease has been reported by Honary.

Thus, it can be seen that biodegradable lubricants will gradually pave their way in various industrial applications which will ultimately help in reducing the harmful effects of the industrial lubricants on environment.

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2. Ponnekanti Nagendramma, Savita Kaul, 2012, Development of ecofriendly/biodegradable lubricants: An overview, Renewable and Sustainable Energy Reviews, 16 (1), 764-774.
3. Shubrajit Bhaumik, M. Kamaraj, 2021, Artificial neural network and multi-criterion decision making approach of designing a blend of biodegradable lubricants and investigating its tribological properties, Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology, 235 (8), 1575-1589.
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**About the Author:**

**Dr. Shubrajit Bhaumik** a Mechanical Engineer who has been working in the area of tribology for past 15 years, He has published several scientific articles in reputed journals of tribology and has also a patent to his credit. He is closely working with several industries towards reducing their failures due to lubrication. Dr. Bhaumik earned several recognition in the field of tribology and have published several articles in reputed journal of tribology. He is also the reviewer of reputed Tribology Journals. He is a life member of Tribology Society of India, Malaysian Tribology Council and ASM International Chennai Chapter. Presently, Dr. Bhaumik is the Secretary of ASM International Chennai Chapter. He can be reached at [shubrajit.projects@gmail.com](mailto:shubrajit.projects@gmail.com).



# Technical Articles

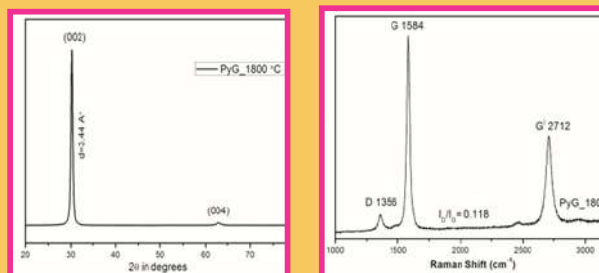
## Pyrolytic Graphite Coating on High Density Graphite by CVD by Shri. E Vetrivendan, IGCAR, Kalpakkam



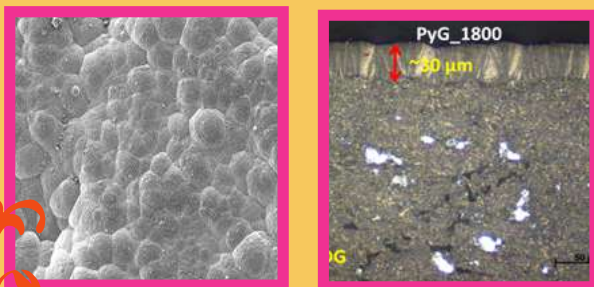
**Fig. 1: SCADA view of CVD Furnace to coat PyG**



**Fig. 2: PyG coated HDG crucibles for U melting and electro refining.**



**Fig. 3: XRD and LRS analysis peaks obtained from PyG surface**



**Fig. 4: SEM and Optical micrograph of PyG coating on HDG**

Pyrolytic graphite (PyG) is a highly oriented dense and crystalline form of carbon, obtained from thermal decomposition of hydrocarbons. The synthetic graphite synthesized by pyrolytic cracking results in a pore-free material with near theoretical density (~2.2 g/cm<sup>3</sup>) and a high degree of crystalline orientation. PyG exhibits superior corrosion, oxidation resistances and anisotropy in thermal and electrical properties compared to conventional graphite forms. PyG coated high-density graphite (HDG) substrates, by chemical vapor deposition, find extensive applications in pyrochemical spent fuel reprocessing involving corrosive molten salts, molten reactive meals and radioactivity. The purity, density, anisotropy and microstructure during pyrolytic growth process strongly depends on the physical nature of the surface of graphite substrate, the flow and concentration of hydrocarbon-inert gas mixture, gas dynamics and substrate/process temperature. Also, the particle/crystallite size, microstrain and the degree of preferred orientation can have a significant effect on the measured physical and chemical properties of the PyG material.

A high-temperature CVD facility for the development PyG coatings on engineering scale components using the pyrolysis of hydrocarbon gaseous precursor is installed at IGCAR. The furnace and the process schematic is shown on Fig.1. The PyG deposited U melting HDG crucible and electro refining vessel revealing lustrous and shiny finish are shown in Fig. 2. The density measurements on the free standing PyG films collected from retort during the coating cycle measured using sink and float technique showed near theoretical density of 2.21 g/cm<sup>3</sup>.

X-Ray Diffraction (XRD) and Laser Raman Spectroscopy (LRS) analysis of the PyG surface are shown in Fig. 3. Indexed XRD patterns reveal intense peaks of (002), (004) lattice planes and absence of other orientation peaks confirm the preferred orientation along the basal plane. The estimated interlayer spacing calculated from (002) peak position was about 3.44 Å. LRS showing G band at ~1584 cm<sup>-1</sup> corresponds to zone center vibration of sp<sup>2</sup> carbon atoms against each other and D band at ~1356 cm<sup>-1</sup> is associated with the presence of disorder in the hexagonal lattice. The intensity ratios of ID/IG of value ~0.1 indicate low disorderness and higher graphitization in the PyG. The SEM micrograph with typical mushroom morphology of columnar grown PyG crystallites and cross sectional polarized light optical micrographs revealing surface nucleated cone formations grown continuously up to the surface of thickness 30 μm are shown in Fig. 4 respectively.

Shri. E Vetrivendan, is with the Corrosion Science and Technology Group (CSTG), Indira Gandhi Centre for Atomic Research (IGCAR). He is currently working on the development of corrosion resistant ceramic thermal spray coatings and Pyrolytic carbon/graphite coatings, its testing and characterizations for future nuclear reactor and reprocessing applications. He received the "Young Engineer Award" for the year 2019 in recognition for the outstanding contributions under DAE (Excellence in Science, Engineering & technology) scheme of awards





# NEW MEMBERS

**Dr. S. Sankaran is a professor in the dept. of Metallurgical and Materials Engineering, IIT Madras. His research interests are in the field of deformation processing of materials, microstructure mechanical behavior correlations in structural materials and transmission electron microscopy**

**Dr. S. NINGSHEN**  
**Scientific Officer/G**  
**Head, Aqueous Corrosion & Protection Section**  
**Metallurgy and Materials Group**  
**Indira Gandhi Centre for Atomic Research,**  
**Kalpakkam 603 102, INDIA**

**Dr. S. NINGSHEN** joined IGCAR, Kalpakkam, in 1996, with more than 25 years of research experience in the field of development of advanced nuclear materials, corrosion related to the nuclear reactor and reprocessing materials, molten salts corrosion, hydrogen embrittlement, passivity and localized corrosion; steam oxidation; ceramic and protective coatings; wear and tribo-corrosion, etc. Some of the notable awards received by Dr. Ningshen includes DAE Scientific and Technical Excellence Award – 2018, NIGIS Excellence in Corrosion Science & Technology Award-2017, DAE Group Achievement Award 2015, the prestigious Japan Society for Promotion of Science Fellowship Hokkaido University, (2011-13), Japan, S.K. Sheshadri Mascot National Award-2009 by Electrochemical Society of India, IISc, Bangalore, Best Ph.D Award by NACE India 2007, Visiting Scientist (1999-2000), IFW Dresden, Germany, etc. Besides, he has received many Best Paper/Presentation Awards in International/National Conferences/Seminars. In addition to his research activities, Dr. Ningshen is a Professor at Homi Bhabha National Institute (HBNI), DAE, and teaches courses on Corrosion Science & Engineering at BARC Training School for Trainees and guide PhD scholars at IGCAR. He has about 95 International Journal publications to his credit and citation of 1807 (h-index 22.)

**Dr.-Ing. K. G. Pradeep** is currently Assistant Professor in the Department of Metallurgical and Materials Engineering at IIT Madras. He completed his PhD from Max-Planck Institut für Eisenforschung GmbH and RWTH Aachen University, Germany. Prior to joining IIT Madras in 2018, he was the Group Leader for Atom Probe Tomography at RWTH Aachen University, Germany. He was also a visiting scientist at Forschungszentrum Jülich, Germany. His expertise lies in the fields of correlative Microscopy and combinatorial alloy design. He has published more than 50 peer-reviewed journal publications in the fields of Physical Metallurgy, Magnetic materials, Atomic scale Microscopy with a h-index of 24. He is currently the Co-ordinator of National Facility for Atom Probe Tomography (NFAPT) as well as the head of Max-Planck India Partner group at IIT Madras.

**Dr. V. Subramanya Sarma** is a Professor in the Department of Metallurgical and Materials Engineering at IIT Madras. He has teaching and research experience of over 20 years in the Metallurgical and Materials Engineering. His current research interests are alloy development, microstructure, texture and mechanical properties correlations in engineering metals and alloys. He was the recipient of the Alexander Von Humboldt Fellowship & the Indo-US Science and Technology Fellowship. He has published more than 125 research papers in refereed journals delivered more than 50 lectures at international conferences. He served as key reader for the journal Metallurgical and Materials Transactions A for the period 2012-2020. He has graduated 8 Ph.Ds, 6 MS and 11 M.Tech students.



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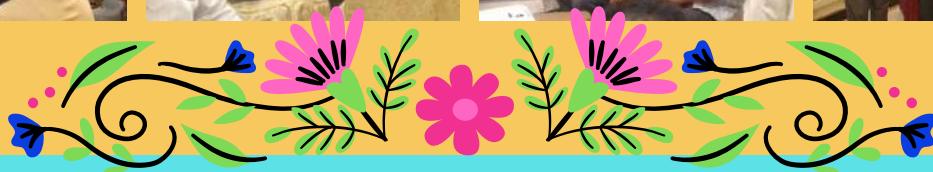
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# Chapter Activities – ASM Trustee Visit

**An interactive session was organized by ASM International Chennai Chapter, with Dr. Kamachi Mudali, Trustee, ASM International and Prof. Ravi Ravindran, Former President, ASM International at 07.00 PM on Saturday, 28 May 2022 at 6.00 PM at JP HOTEL, Chennai**

The meeting discussed  
(i) MA chapter programmes  
(ii) ASM Chennai chapter future activities and (iii) HTSE-2023: International Conference program.



## Report on Meeting of ASM International Chennai Chapter members with Prof. Ravi Ravindran and Prof. U. Kamachi Mudali

An interaction meeting was organized by ASM International Chennai Chapter on 28 May 2022 at JP Hotel. The meeting was graced by Prof. Ravi Ravindran, Past President of ASM International, and Prof. U. Kamachi Mudali, Trustee of ASM International (2021-2024) and Past Chairman of ASM International Chennai Chapter. The meeting was chaired by Prof. M. Kamaraj, Chairman of ASM International Chennai Chapter. Prof. Ravi Ravindran mentioned about importance of attracting young members and student members to ASM. He mentioned that even if 10-20% of student members become professional members after graduating, it would add significantly to the membership. He appreciated that several initiatives taken by the ASM International Chennai Chapter under the leadership of Prof. U. Kamachi Mudali, Prof. Kamaraj and Mr. Samapathkumar has helped in establishing 3 new Material Advantage Chapters at SSN College of Engineering, VIT Bhopal and Anna University. Further he appreciated the activities of the 3 existing MA chapters NIT Trichy, SRM Institute of Science and Technology and Manakula Vinayagar Engineering college, Puducherry. He complimented and appreciated the industry members who came forward to support student membership by sponsoring 50% of their membership fee. Prof. Ravindran discussed about the focus of ASM on several areas such as ASM Digital Ecosystem, Materials Genome project, Materials 4.0 and sustainability by focusing on 3Rs or Reduce, Re-use, and Recycle. He also urged the chapter to think about a strategic plan of how to grow the membership and outreach of ASM Chennai Chapter among professionals in and around Chennai. He also narrated his long association with the Chennai Chapter starting with its founding members. Prof. Kamachi Mudali also informed about HTSE 2023 Conference & Expo being planned in Chennai Trade Centre on 28-30 Sept. 2023. He also appreciated the efforts of Prof. Ravindran for his initiative of reduced membership fees for Indian citizens and he stressed that all chapters have to ensure that membership is increasing to continue the reduced membership fees. Prof. Kamachi also mentioned that Mr. Pradeep Goyal will become the ASM President next year and it is a proud moment for all Indians. He appreciated the efforts of young members of the chapter in supporting the activities.



# Chapter Activities - Technical Talks

**Technical talk (Webinar) was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a WEBINAR TECHNICAL TALK by Mr. Alagiri Govindasamy, Director, Future Connect and PMCGS Private Ltd on "Industry 4.0 – Significance, Challenges, Current Trends, and Future Scenarios" at 06.30 PM on Saturday, 10 July 2021.**

Industry 4.0 (Digital transformation) is altering the long-standing industry status quo forever, redrawing the way organizations function and clearly define the silver line between winner and loser. This session will offer insights into Industry 4.0 ecosystem, how it will result in superior business benefits and typical implementation challenges. Few critical topics like organizations' paradoxical position noticed from the Industry, current status, and futuristics scenarios were discussed in this seminar.



Mr. Alagiri Govindasamy is the Director, Future Connect ([www.futureconnect.net](http://www.futureconnect.net)) and PMCGS Private Ltd. He completed his M.S from BITS - Pilani, Strategic management certification from Harvard Business Publishing - USA, MBA from Manchester Business School – UK and pursuing part time doctoral (DBA) program from Nottingham Trent University - UK. He is a Visiting Faculty at Indo-German Training Centre, Adjunct Faculty at NMIMS – Mumbai and Visiting faculty at SP Jain School of Global Management – Global locations. Has Secured vast international expertise from 18 countries and spent 10+ years out of India and Managed large business transformation initiatives, IT outsourcing deals, large scale ERP implementations and digital transformation initiatives for leading MNC's. He is involved in consulting and training for 25+ years.

## " TEST YOUR KNOWLEDGE "

1. An alloy of Fe -0.4% C is

- (a) Cast iron (b) Hypo-eutectoid steel (c) Hyper eutectoid steel (d) eutectoid steel

2. Martensite in Steel is

- (a) an interstitial solid solution of C in alpha iron  
(b) a supersaturated interstitial solution of C in BCC iron  
(c) a supersaturated solid solution of C in gamma iron  
(d) a very finely dispersed lamellar structure

3. A 0.2% C steel is equilibrated just above the eutectoid temperature and then quenched in ice brine. The room temperature microstructure will consist of

- a) 77 % ferrite and 23 % martensite (b) 76 % ferrite and 24 % pearlite  
c) 60 % ferrite and 40 % martensite (d) 97 % ferrite and 3 % martensite

b) In the eutectoid steel, which one of the following structures does not form during continuous cooling?

- (a) Fully pearlitic (b) Pearlitic + Bainitic (c) Fully bainitic (d) Martensitic

c) An annealed plain carbon steel, showing fully pearlitic microstructure, has a carbon content of :

- (a) 0.01% wt% (b) 0.20 wt% (c) 0.77 wt% (d) 1.20 wt%

d) Which of the following are not commercially manufactured by powder metallurgy?

- (a) Aircraft brake pads (b) self-lubricating bearings (c) Tungsten carbide based cutting tools (d) Turbine blades

e) Which of the following is not a solid-state welding process?

- (a) Friction stir welding (b) Ultrasonic welding (c) explosive welding (d) Flux-cored arc welding

f) Which of the following materials is not suitable as a die material for wire drawing?

- (a) Diamond (b) Tungsten carbide (c) Tool steel (d) Bronze

g) For the manufacture of thin foils of aluminium, which one of the following rolling mills is used?

- (a) Three-high rolling mill (b) Sendzimir mill (c) Four stand continuous mill (d) Planetary mill

h) In which of the following sheet material is the spring back effect significant?

- (a) Aluminium alloys (b) Stainless steel (c) Magnesium (d) Lead

# Chapter Activities - Technical Talks

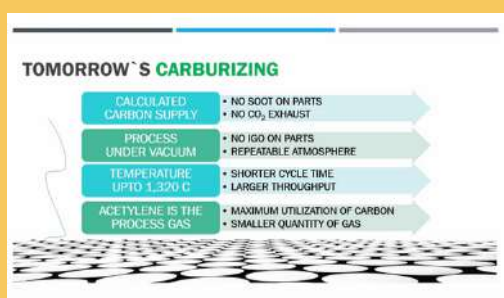
**Technical talk (Webinar) was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a WEBINAR TECHNICAL TALK by Dr. Kuldeep Rana, Central Power Research Institute, Bangalore on "Li-Ion Battery Technologies in Electric Vehicles and Opportunities for Advancements" at 07.00 PM on Saturday, 28 August 2021**

LIBs have been recognized as the most promising technology for energy storage applications. These batteries have been extensively being used from powering the portable electronics devices, large scale energy-storage and other niche application. In order to achieve the climate goals of the Paris agreement, large scale deployment of electric vehicles (EVs) and green energy-storage systems, are driving the rapid growth of the LIB market. Although LIBs have been greatly successful as power sources in various applications, they are evolving continuously for further improved performance in many aspects. Existing battery chemistry still face performance and cost challenges, developing advanced cells chemistry always requires the discovery of new materials, new chemistry and an increased understanding of the cell fabrication processes on which the devices performance depend. The overall performance of the cells is limited by the fundamental behaviour of the used materials and their processing. In this talk details of available battery chemistry for EV application was discussed including, battery components, battery cell and pack fabrications for EV, materials supply chain and testing requirement for EV application.

Dr. Kuldeep Rana is working as scientist in Electrical appliances technology division of Central Power Research Institute since 2015. He is involved in R&D, certification and consultancy activities of electrochemical energy storage devices. Prior to joining the CPRI he was working as a research professor in department of Electrical and Electronic Engineering of Yonsei University, South Korea under brain Korea fellowship. He has also worked as postdoctoral fellow in Advanced Centre of Nanotechnology, SKKU South Korea. He has received his Ph.D. degree in Materials Engineering from the Indian Institute of Technology, Roorkee in area of energy storage materials and devices. During his Ph.D. work he has worked as visiting researcher in department of Materials Science and Metallurgy of Cambridge University. Dr. Rana is a principle member for e- mobility, battery committee of bureau of Indian standard, Member of Standard and Labelling program of Bureau of Energy Efficiency for advanced cell chemistry, and also drafted guidelines for batteries for the solar application with Ministry of new and renewable energy and member in Electric vehicle R&D mission.



**Technical talk (Webinar) was organized by ASM International India Chapter organized a WEBINAR TECHNICAL TALK by Mr. M.S. Ganesh, Consultant on "Vacuum Carburizing" at 07.30 PM on Saturday, 04 September 2021.**





# Chapter Activities - Technical Talks

**Technical talk (Webinar) was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a WEBINAR TECHNICAL TALK by Dr.T.Sundararajan Chairman, IIM Chennai Chapter & Head Technical Tube Products India, Chennai on "Intellectual Property Rights and Their Scopes in Manufacturing Industries" at 07.00 PM on Saturday, 02 October 2021**

TITLE	
INTELLECTUAL PROPERTY RIGHTS	
<b>OBJECTIVE</b> Presenting the basic information on various types of intellectual property rights (IPR) and their scopes in manufacturing industries.	<b>CONTENT</b> <ul style="list-style-type: none"><li>• Types of IPR: Focus on Utility Patents</li><li>• Other IPR types such as Design patents, Copyright and Trademark</li><li>• Novelty of the Innovation: Classification</li><li>• Validity period for Granted patents, copy rights and Trademarks</li><li>• Procedure for Filing, Review and Jurisdiction</li><li>• Patent rights: Legal and Technical</li><li>• Patent Infringement and Remedies</li><li>• Case studies</li></ul>
<b>FOCUS</b> <ul style="list-style-type: none"><li>• To introduce various types of IPR and their scope and validity</li><li>• Difference between Innovation and Novelty</li><li>• How to read and understand the patents</li><li>• How to classify research work whether patentable and non-patentable</li></ul>	<b>DELIVERABLES</b> <ul style="list-style-type: none"><li>✓ Understanding on Patents, Copyright and Trademark</li><li>✓ Knowledge on Innovation and their novelty for patents application</li><li>✓ Distinction between patents and knowhow</li><li>✓ Search and Interpretation on patent content for the given projects</li><li>✓ Procedure for patent application and Grants</li></ul>



Dr. T. Sundararajan had 27 years of experience in both academic and industrial research and he currently Head of Technical at Tube Products India. His major field of expertise include Design and Development of Automotive Components, Forming, Welding, Corrosion and Surface Engineering. He is the fellow of ASM International, USA, Indian Institute of Metals, India and Academy of Sciences, India. Dr. Sundararajan published more than 50 International Publications and 18 patents applied out of which 10 patents are granted.

**Technical talk (Webinar) was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a WEBINAR TECHNICAL TALK by Mr. RAVISHANKAR, CONSULTANT, Chennai on "Latest trends and opportunities in Thermal processing" at 07.00 PM on Saturday, 30 December 2021**



**Thermal processing / heat treatment plays a major role in design / process and performance of components used in industries. The Focus on improvements in heat treatment had been driven by cost, quality, consistency etc. Recent developments in technology, digitization, concern to protect environment, challenges to improve performances has resulted in new technologies getting adopted in thermal processing. New heat treatment processes like thermal processing of castings, surface treatments that improve performances by 10X, use of micro alloyed steels to reduce cost, are some of the latest trends being practiced by industries. Adopting these technologies will provide benefits.**

**Mr. Ravishankar discussed on such developments that are getting adopted by industries for significant value addition and productivity improvement.**

**Mr. Ravishankar holds degrees in M Tech (IIT Madras), MBA. He has more than 30 years experience in material selection, process approval and performance evaluation of components for automotive industries and general engineering industries. Previously he was Head - Metallurgy Department, Component Testing - Ashokleyland Ltd. (11 years), HEAD-TQM, where he was responsible for implementation of quality system to qualify for DEMING AWARD Implement TS16949 quality system across organization. Drive cost reduction through tear down study and bench marking. Head - R&D - Tube investment of India - TI diamond chain (17 years) with responsibilities for developing new Heat treatment process, alternate material. Design and development of special purpose machines. He also served as a Metallurgy Assistant - Southern railways (3 years) and Quality control head - Jothi malleable (1 year). His expertise includes Development of material to suit component level performance - steel, polymers, elastomers Evaluating international specifications for material, evaluating sources and approving Failure Analysis, failure simulation, failure resolution, Development of alternate surface treatments, lubricants, engine oils, coolants, paints Development of alternate materials, processes for value enhancement, Development of new heat treatment process for value enhancement. He also has to his credits 2 Patents applied, Member of SAE Tribology society of India and Member of ASM international.**

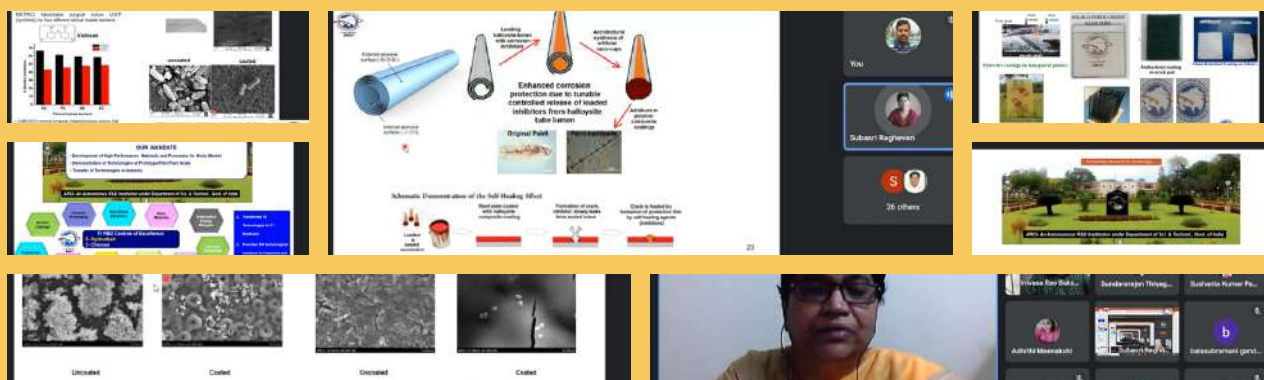
## Chapter Activities - Technical Talks

**Technical talk (Webinar) was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a WEBINAR TECHNICAL TALK by Dr. R. Subasri, Centre for Sol-Gel Coatings, International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad, India on "Engineering Surfaces through Sol-Gel Nanocomposite Coatings to Achieve Multi-functionalities" at 07.00 PM on Saturday, 16 October 2021**

The unique properties of nanostructured materials obtained through wet chemical routes like sol-gel process are now well appreciated and have been exploited to make viable products. Sol-gel derived organic-inorganic hybrid nanocomposite coatings have been extensively researched due to several advantages they can offer to the field of surface engineering. The most obvious advantage of these coatings is that they can favourably bring synergy between the dissimilar properties of organic and inorganic components in a single material, thereby paving way for generating multifunctional coatings in a single-step coating deposition. Sol-gel derived hybrid nanocomposite coatings have been found to be promising for diverse applications especially where environmental friendly alternatives are being explored, like e.g. hexavalent chrome-free corrosion protection (barrier and self-healing type) on metals/alloys. The nanocomposite coatings are also useful to achieve functionalities such as easy-to-clean hydrophobic/ice-phobic, anti-reflection, fully dielectric solar control, up-conversion in solar cells, anti-bioadhesive antibacterial, antifouling, self-cleaning/photocatalytic, scratch resistance etc. This talk focused on the various applications of sol-gel nanocomposite coatings with emphasis on self-healing corrosion protection coatings on Al/Mg alloys.

**Dr Subasri is a chemist by training. She obtained her Masters degree in Chemistry from IIT, Madras, India in 1993 and PhD in Chemistry during 1999 from the University of Madras, Tamil Nadu with the research work carried out at Indira Gandhi Centre for Atomic Research, Kalpakkam. After brief stints as a post doctoral fellow at the Functional Ceramics Group of Max Planck Institut für Metallforschung, Stuttgart, Germany and at National Institute for Materials Science, Tsukuba, Japan, she returned to India and joined Advanced Research Centre International (ARCI) Hyderabad in March 2005 as a senior scientist. She has been leading the Centre for Sol-Gel Coatings at ARCI, since April 2006. Her team has set up a unique and state-of-the-art comprehensive facility for demonstration of sol-gel nanocomposite coating technology for commercialization in the Indian/global market. She has 92 publications in peer reviewed international journals, 8 book chapter contributions, 12 Indian patents (granted); 4 US patents and 3 European patents (granted); 3 Indian patent applications; 1 European Patent application (pending) to her credit and has delivered more than 50 invited talks at various international/national conferences. She is a Max-Planck-India Fellow. She is a life member of professional bodies namely Materials Research Society of India (MRSI), The Electrochemical Society Inc. (ECS), International Sol-Gel Society (ISGS) and Indian Institute of Metals (IIM). She received the Materials Research Society of India (MRSI) medal in February 2015 in recognition of her significant contributions to the field of Materials Research and Engineering. She is a regular reviewer for SCI Journals namely Progress in Organic Chemistry, Journal of Non-Crystalline Solids, ACS Applied Materials and Interfaces, Solar Energy Materials and Solar Cells, Journal of Alloys and Compounds, Materials Research Bulletin, Journal of Applied Electrochemistry, Applied Surface Science, Surface and Coatings Technology etc.**

Her research interests include sol-gel nanocomposite coatings for different functionalities, corrosion protection; microwave sintering of ceramics and solid state electrochemistry



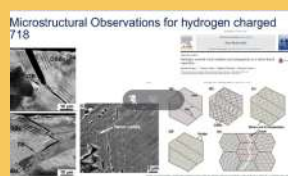
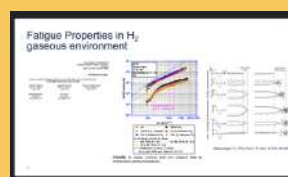
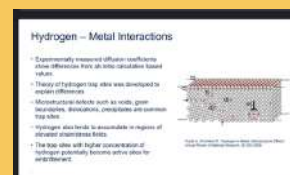
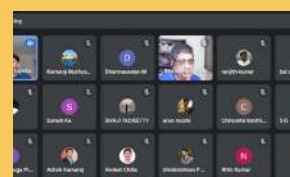
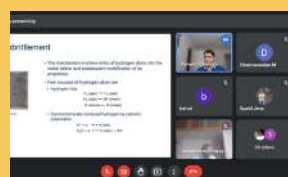
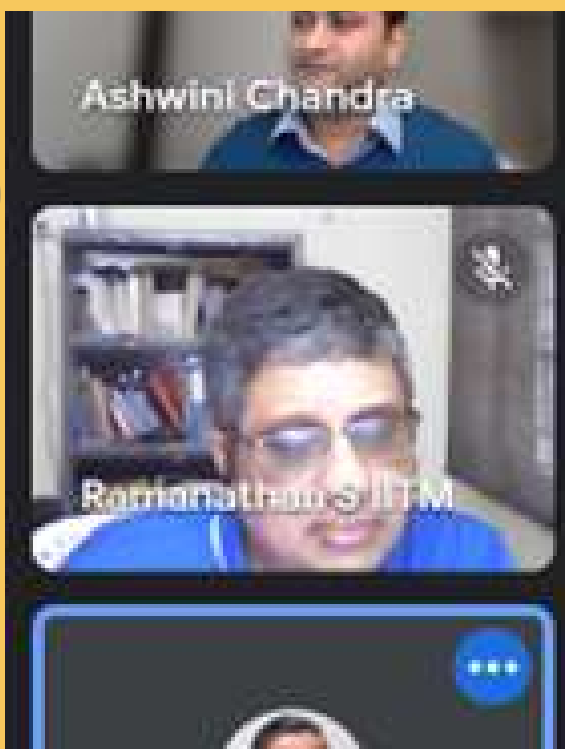


# Chapter Activities - Technical Talks

**Technical talk (Webinar) was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and NACE International Gateway India Section South Zone, (NIGIS-SZ) organized a WEBINAR TECHNICAL TALK by Mr. Ashwini Chandra Senior Research Engineer, DNV, USA on "Hydrogen Embrittlement challenges in Oil and Gas industries" at 05.00 PM on Saturday, 29 Jan 2022**

Mr. Ashwini Chandra is a Materials engineer at DNV's research laboratory based in Columbus, Ohio, USA. He joined DNV after his tenure at The Ohio State University as a graduate research associate. Prior to his graduate studies, he completed his undergraduate education at the Indian Institute of Technology Roorkee. While at DNV, Mr. Chandra's responsibilities have led to the development of expertise in electrochemical and characterization techniques with focus on materials and corrosion related challenges in the oil and gas industry. The projects have included work on adsorption behavior of corrosion inhibitors, galvanic corrosion, carbon dioxide corrosion, coating evaluation, hydrogen embrittlement, stress corrosion cracking susceptibility and AC corrosion susceptibility of materials. More recently, Mr. Chandra has managed a Joint Industry Project with 7 industrial partners from Oil and Gas Majors and equipment manufacturers, executed several projects related to materials qualification for offshore oil and gas development projects, and is currently pursuing study on the effect of hydrogen-methane blends on fatigue and fracture properties of line pipe steels.

Several materials and corrosion related challenges needs to be considered for safe operation of oil and gas industry assets. Hydrogen embrittlement is one of the several mechanisms that presents a significant risk. Nickel based alloys are used as structural material in subsea high pressure high temperature oil and gas production systems due to their excellent corrosion resistance in the harsh environments. However, there is a risk of hydrogen embrittlement from potentials that are encountered as a result of being in contact with other metallic systems with imposed cathodic protection. The impact on fracture and fatigue properties for this system are presented along with the use of electrochemical and modeling tools to understand the fundamentals of hydrogen embrittlement pertinent to the Ni system. Recently, there has been a significant push to reducing the carbon footprint of the oil and gas industry and hydrogen is being proposed as a cleaner alternative to natural gas. Currently the gas transmission and distribution networks are designed for natural gas. Hydrogen is proposed to be blended with natural gas to use the existing infrastructure; however, this poses risks of hydrogen embrittlement. These issues in the current scenario were discussed.



# Chapter Activities - Technical Talks

The talk covered the fundamentals on corrosion of electroless nickel coatings. The various corrosion test methods followed for E.N coatings along with the corrosion resistance evaluation of the coatings were presented. The developments with new Atotech high corrosion resistant processes were also highlighted during the talk.



**Technical talk (Webinar) was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a WEBINAR TECHNICAL TALK by Shakeel Akhtar, Global Product Manager & Business Development Manager (Wear Resistant Coatings), ATOTECH, UK on "Evolution leading to revolution - New developments in Electroless Nickel corrosion protection" at 07.00 PM on Saturday, 12 February 2022**

Mr. Shakeel Akhtar, Global Product Manager & Business Development Manager (Wear Resistant Coatings) has worked for Atotech for over 30 years and is based in the UK. As a specialist in electroless nickel plating, but he has extensive knowledge of surface finishing including functional chrome. At Atotech, Shakeel has held various positions such as R&D Development Chemist, Product Specialist, Global Application Manager, Technology Manager and Product Manager for Wear Resistant Coatings. He has gained extensive international experience serving customers around the world and was based in Singapore for six years. In his current position Shakeel oversees Atotech's global product range and business development opportunities for WRC

**Substrate Surface**

- Surface roughness – generally, the smoother surfaces lead to lower defects in the EN coating
- Fabricating operations such as rolling, stamping, casting, shearing, lapping, drawing, machining and grit blasting can lead to defects. Inclusions in the substrate may lead to pores and pits in the EN coating
- Defects in the surface such as cavities, pits and pores will be replicated by the EN coating and negatively effect corrosion resistance

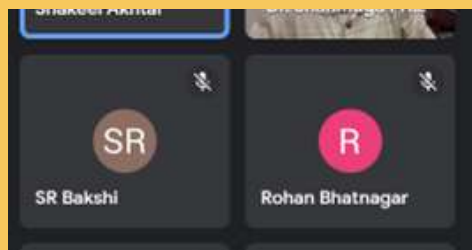
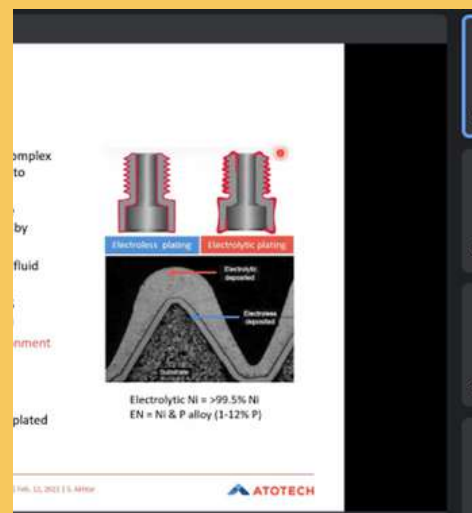
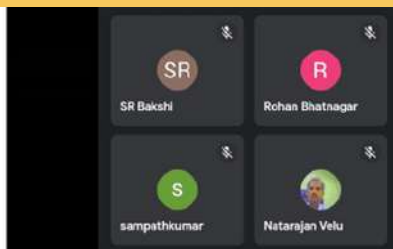
**Pretreatment**

- Appropriate cleaning of the substrate is essential
- Oils, greases, soils, smut & particulates from the surface have to be completely removed to avoid pits and pores

**Bath filtration and agitation**

- Filter pore size and bath turnover rate are essential to ensure efficient removal of particulates from the bath
- Agitation in the bath is important to ensure good circulation of solution and effective removal of gas bubbles from the surface

**EN process formulation**



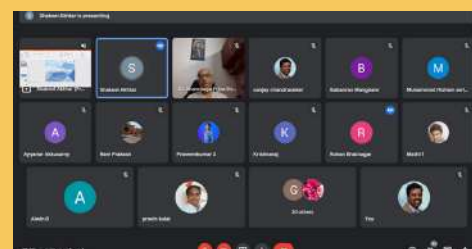
- Wear resistance coatings are classified into two types of processes:
  - Chromium nickel (NiP)
  - Functional chrome (FC)
- They must withstand wear in a diverse range of applications
  - Protection of a softer and less wear resistant base metal (e.g. electroless nickel, hard chrome)
- When used in a corrosive environment, wear resistant coatings must additionally provide an excellent corrosion protection
- There are two mechanisms of corrosion protection for steel, copper and aluminium
  - Anodic protection:
    - Successful corrosion of coating (sacrificial) to protect the base metal (sacrificial), e.g. Zn on steel
  - Barrier coatings:
    - Protection of the substrate is achieved by applying a more noble metal coating to act as barrier layer (e.g. electroless nickel coating (EN) on steel substrate)

**Mechanism of electroless nickel on steel:**

- EN is a cathodic coating in most environments
- Assures excellent protection by forming a continuous and undamaged coating
- Prevents most corrosive attacks
- Almost no change in appearance

**Presence of pores or cracks:**

- Immediate attack of the base material
- Change of appearance





# Chapter Activities - Technical Talks



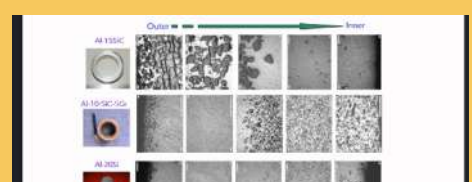
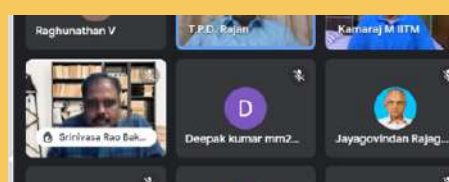
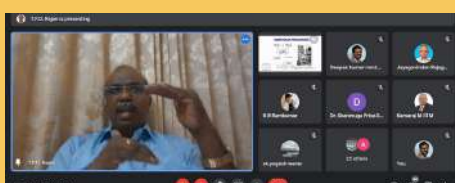
**Technical talk (Webinar) was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a WEBINAR TECHNICAL TALK by Dr. T.P.D Rajan, Senior Principal Scientist, Materials Science and Technology Division & Chairman, Academic Program Committee, CSIR - National Institute for Interdisciplinary Science and Technology, Trivandrum – 695 019, INDIA. on "Lightweight Metallic Materials for Automotive and Aerospace systems" at 07.00 PM on Saturday, 05 March 2022**

Dr. T.P.D Rajan is currently Senior Principal Scientist, Materials Science and Technology Division at CSIR-National Institute for Interdisciplinary Science and Technology, Trivandrum. He is also the coordinator of the "Centre of Excellence for Lightweight Material Technologies" and Chairman, Academic Programme Committee at CSIR-NIIST. His major area of research are light metals, metallic composites, functional graded materials and smart coatings. He has contributed immensely in development of lightweight materials and engineering components such as aluminum alloy / composite based brake rotor disc, cylinder liners, connecting rod and crankcase for automotive, composite armours, first gear housing and piston rings for defence systems and carbon fibre reinforced and thermal management composites for aerospace systems. He had completed M.Tech. in Process Metallurgy from NITK, Surathkal and PhD in Metallurgical Engineering from CSIR-NIIST.

He had published 145 research papers, 10 book chapters, few patents and delivered more than 100 invited lectures. He is recipient of various national awards which includes Award for Excellence in Corrosion Science and Technology conferred by NACE International, IIM

Nalco Gold Medal conferred by The Indian Institute of Metals (IIM), Chandran Menon Memorial Award for Applied Research and Innovative Technology and IIF Industry Research Award conferred by The Institute of Indian Foundryman, INAE Innovation Potential Award conferred by Indian National Academy of Engineering.

Lightweight materials have become increasingly critical and significant in the transportation sectors, including automobile, aerospace, rail, marine, and defense systems. The range of potential applications for lightweight materials has continuously increased in recent years, especially in the automotive and aerospace industries. The core light weighting objectives can be achieved through a number of individual strategies or their combinations that balance the design and material factors. Lightweight metallic materials include the alloys, composites and foams of aluminum, magnesium, titanium, beryllium and lithium. The talk focus on the current developments and future perspectives of these lightweight materials in manufacturing various components and structures for the automotive and aerospace systems. Recent years have witnessed extensive research aimed at developing materials capable of providing the desired strength to a part while keeping its weight as low as possible. Reduction of weight is one of the most important strategies for lowering vehicle emissions and fuel consumption and enhancing the payload capacity. Lightweighting will continue to be in focus even as the industry is shifting from ICE to EV.



# Chapter Activities - Technical Talks

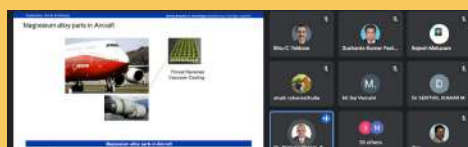
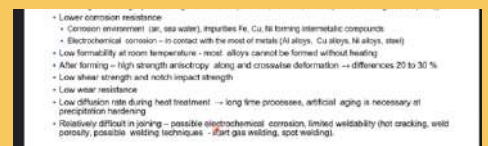


**Technical talk (Webinar) was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a WEBINAR TECHNICAL TALK by Dr. Kishora Shetty, Engineering Lead— Manufacturing Technology Integration, Boeing Research & Technology, Boeing India Private Limited, Bangalore on "Reimagining the Aerospace Materials & Their Advancements for 21st Century" at 07.00 PM on Saturday, 16 April 2022**

The talk covered the introduction to Aerospace Materials, Aerospace Materials Requirements, Development of Aircraft materials for airframe structures, Material selection in Aircraft Design, Aluminium alloys, Magnesium alloys, Titanium alloys, Steels, Shape Memory Materials, Composites including Fiber Metal Laminates and Sandwich materials, non-metallic materials, new developments in these materials, Research avenues in Aerospace materials etc.

Dr. Kishora Shetty is An Engineering professional with 24 years of experience in Aerospace Materials & Components, Airworthiness Certification, Manufacturing, Research & Development, Components testing and Materials selection, Suppliers and External Laboratories development, Suppliers approval, Materials testing, NDT etc. NDT Level II and Six Sigma Green Belt certified. He is a Metallurgical Engineering graduate from NITK Surathkal, M.S in Materials Engineering from IISc, Bangalore, PhD in Management from ZIBM, Mumbai and PhD in Engineering from AcSIR – NAL, Bangalore.

Presently working as Engineering Lead – Manufacturing Technology Integration at Boeing India. Previously worked as Tech Lead – Materials at Rolls-Royce India Pvt. Ltd, Senior Lead Engineer- Airframe at Airbus India, Staff Engineer – Materials at Bloom Energy (India) Pvt. Ltd, Scientist in CEMILAC, DRDO and Engineer at Indian Seamless Steels & Alloys Ltd, Pune. He is a member of several professional societies, published several papers and has won many awards.





# Chapter Activities - Technical Talks



**Technical talk was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a TECHNICAL TALK by Dr. Prabhu Ramanujam, Technical Sales Representative, Ceramics Pan Global, Deputy General Manager, Hindalco Industries Ltd, Aditya Birla Group Belgaum – 695 019, INDIA on "Ceramics and their exciting applications from tiles to hypersonics" at 07.00 PM on Saturday, 30 April 2022 at Hotel Radha Regent,, Arumbakkam, Chennai,**

Dr. Prabhu Ramanujam is a Technical Sale Representative, Ceramics vertical PAN global at Hindalco Industries Limited, India, a part of Aditya Birla Group. He is developing High Purity Alumina (HPA) for LiB and various value-added alumina products. Prior to that, he was heading R&D at Wendt India Ltd, Murugappa group. During his tenure, he developed Diamond & cBN grinding wheels for various automotive applications. He completed his masters in

Materials science in 2008 and Ceramic Technology in 2010 at Anna University. He completed his PhD on Transparent YAG ceramics at Loughborough University, UK, under the guidance of Prof. Bala Vaidhyanathan and Prof. Jon Binner in the Materials Department, funded by Morgan Advanced Materials, UK. He was a research fellow at the University of Birmingham and at Loughborough for 3 years, worked on UHTC composites with DSTL, AFRL & MBDA and electroceramics on the multilayer capacitors with Syfer Technologies, UK. He has published more than 11 journals and 12 conference proceedings, 1 book chapter, and 4 patents (filed). He is a recipient of awards from the European Ceramic Society (Young Ceramic Network, YCN), Armours & Braisers, UK, IOM3, UK, Innovation award from Murugappa Group, and Fast starter from Aditya Birla Group. His research interests are Bayer processing of Alumina, nanoparticle synthesis and characterization, colloidal processing of ceramics, flash sintering, UHTC composites for hypersonic applications and

super abrasives for Grinding & Honing applications.

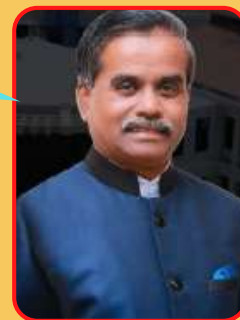
The talk focused on ceramic materials for various applications. Starting with the versatility of alumina, 80 different grades of alumina, their exciting applications covered at Hindalco Chemicals, and the global market challenges. Recent developments in subtractive

manufacturing of Automotive and Aerospace components using Diamond and cBN grinding wheels. A glimpse of Ultra high-temperature ceramics (UHTC) for hypersonic vehicles and the extreme environment testing. Processing of nanostructured ceramics and their challenges.



## Chapter Activities - ASM Trustee Visit Lecture

**ASM Trustee Visit Lecture was organized by ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society by Dr. U. Kamachi Mudali, Trustee, ASM International, Honorary Professor of Practice, IIT Madras & Vice Chancellor, VIT Bhopal University, Kothrikalan – 466 114, Madhya Pradesh State on "E-Waste Management towards Circular Economy" at 07.00 PM on Saturday, 28 May 2022 at JP Hotel, Koyambedu, Chennai,**



Electronics Waste or e-waste refers to electrical and electronic equipment, whole or in part discarded as waste by the consumer or bulk consumer as well as rejects from manufacturing, refurbishment and repair processes [1]. E-waste is an emerging problem of entire world and a new environmental challenge. The growing population and insatiable demand for electronic devices is creating the world's fastest growing waste stream which is growing exponentially. The United Nations calls it a tsunami of e-waste due to huge quantity of e-waste being generated presently, of which only a minuscule is recycled. The e-waste stream is complex comprising of three major constituents - glass, plastics and metals. It contains many high-value and scarce materials, such as gold, silver, copper, platinum, and palladium, rare earths, and high quantities of iron, aluminum and tin. About 50 million tonne e-waste is produced in the world every year. Worldwide, only 20% of e-waste is handled appropriately, there is little data on what happens to the rest. Voluminous e-waste offers a huge economic opportunity with the material value alone worth \$62.5 billion, which is more than the GDP of most of the countries [2]. Thus, e-waste is a precious resource for urban mining. Harvesting the resources from e-waste is largely less energy intensive and produces substantially less CO<sub>2</sub> emissions than mining in the earth's crust, and offers significant opportunity for businesses, policymakers and workers worldwide. It is pertinent to mention that adoption of the 6Rs concept (Reduce, Reuse, Recycle, Recover, Redesign and Remanufacturing) is the basis for sustainable e-waste management and accelerating circular economy.

The author presented an overview of current e-waste scenario, associated environmental and health hazards, existing recycling technologies, practices and importance of recycling towards circular economy.

[1] & [2]: U. Kamachi Mudali, Manisha Patil, R. Saravanabhavan and V.K. Saraswat, Review on E-Waste Recycling, Transactions of INAE, Vol.6, Issue 3, 2021; Part I, pp.547-568 & Part II, pp.613-631.

Dr. U. Kamachi Mudali, Vice Chancellor of VIT Bhopal University is an internationally renowned materials and corrosion specialist with more than decades of R&D, Industry and Academic expertise. Dr. Mudali has 468 Journal publications, 21 edited Books, 5 patents, 275 Honour Lectures, and 10425 citations with a h-index of 46 and i-10 index of 253 and is recognized in the World's Top 2% scientists from India in the field of Materials. Dr. Mudali has guided/coordinated UG, PG and PhD theses of 162 students from various academic institutions. Dr. Mudali is Chief Editor of Journal of Electrochemical Society of India and Editor-in Chief of IIM-Springer Book Series and CII-Corrosion Management Committee Booklet Series. He is Fellow & Trustee of Board of ASM International, USA, Fellow of 12 professional associations including 3 from abroad, and a Honorary Member of Indian Institute of Metals (IIM) and UDCT Alumni Association, Mumbai. Dr. Mudali is decorated with several distinguished recognitions including Distinguished Alumnus Award from both IIT Bombay where he did M.Tech (Corrosion Sci & Engg.) in 1984, and PSG College of Technology, Coimbatore, where he did MSc (Materials Science) in 1982; Metallurgists of the Year Award from Government of India & Indian Institute of Metals (IIM) &, and GD Birla Gold Medal and Platinum Medal from IIM; Tamilnadu Scientist Award; MASCOT National Award; VASVIK Award; Indian Nuclear Society Medal; Distinguished Faculty Award from HBNI University; AICTE-INAE Distinguished Visiting Professorship by INAE; Homi Bhabha Science and Technology Award of DAE; Group Achievement Award from DAE (5 times); ONGC Excellence & Meritorious Awards in Corrosion from NACE India and NCCI, Karaikudi; Frank Newman Speller Award of NACE International, USA, the highest recognition and first Indian to get in the field of corrosion. Dr. Mudali was Visiting Scientist and widely travelled in USA, Germany, Russia, France, UK, Japan, Malaysia, Israel, Bulgaria, Canada, and Singapore. Dr. Mudali has provided his leadership and expertise as Chairman to Committee on Strengthening Recycling of E-waste (NITI Aayog, GoI); MTD24-Corrosion Protection and Finishes Committee of BIS; and, Corrosion Management Committee of CII, Chandigarh. As President he has led 10,000+ members of Indian Institute of Metals; Electrochemical Society of India; and, NIGIS South Zone; and, as Chairman he has led East Asia Pacific Area & Indian Section of the National Association of Corrosion Engineers (NACE), USA; ASM International, Chennai Chapter (2015-2017); and, Indian Institute of Chemical Engineers-MRC, Mumbai.

Dr. Mudali is also Honorary Professor of Practice at IIT Madras, and was formerly Distinguished Scientist of Department of Atomic Energy (DAE), and Chief Executive & Chairman of Heavy Water Board, a flagship industrial unit of DAE during 2017-2020. He was at the Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam during 1984 to 2017, and finally served there as Director of Materials Chemistry and Metal Fuel Cycle. As an accomplished team leader, Dr. Mudali has made pioneering contributions towards the production of heavy water and specialty materials; advanced materials & coating technology development; corrosion science, engineering and technology; materials, process and equipment development for reprocessing applications; failure analysis, consultancy and societal contributions.





# ASM INTERNATIONAL CHENNAI CHAPTER

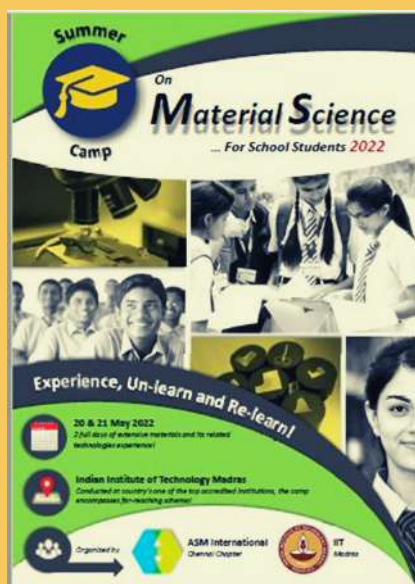


## TEST YOUR KNOWLEDGE:

**Answers: 1 (b); 2 (b); 3 (b); 4 (C); 5 (C); 6 (d); 7(d); 8 (d); 9 (b); 10 (a)**



# FORTHCOMING STUDENT'S CAMP- DEC 2022



## MATERIALS Camp FOR SCHOOL STUDENTS - Dec 2022

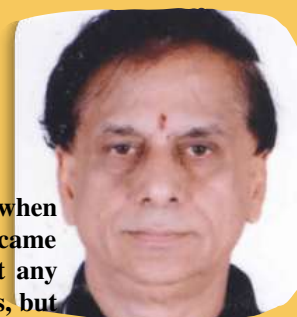
The domestic need for knowledge and resource investment in Material Science and Engineering has been sky-rocketing in the past few years more than any other field of technology has seen in the same amount of time. In this context ASMICC the premium voluntary organisation for the materials technology community, understanding the need and urge to equip the younger generations of the country for this progress, has come forward with various visionary ideas with one of those being the subject **2 day Winter Camp on Material Science for School Students is scheduled to be held in December 2022.** The camp would enable the student population to get an in sight and hands-on in the subject of Materials and its related technologies to cope with and to face the fast approaching challenges and needs.

### 2019 Summer Materials Camp Memories



### IN MEMORIAM

Entrepreneur, Philanthropist, Customer Centric, Loyalist are some of the words which come to mind when we think of R G Sadagopan, a name synonymous with furnaces. He was a pioneer and visionary when it came to heat treatment furnaces. After losing both his parents at the age of 7, he came up in life without any support. He was a self-made man. Today we remember him not just through his work and achievements, but through his service, philanthropy and helping tendency.



RGS, as he was fondly referred to, was a born entrepreneur. Fascinated by mechanisms, he grew up learning how machines worked and began to assemble watches when he was 5 years old. Preetham recalls, his father was always quick to learn and constantly updating himself, learning about the latest furnaces and technologies to ensure his products continued to remain state-of-the-art. It was his constant thirst to learn that helped him be a leader in his space.

At 30, he started his first business, Welmech Engineering Company Private Limited and a year later, Thermal Systems and Engineering, both now looked after by his second son, Preethamkumar Sadagopan. Operating with more than 100 employees, these companies are based out of Ambattur Industrial Estate, Chennai. The companies design, manufacture, install and commission specialized furnaces, ovens and surface treatment plants. R G Sadagopan eliminated that problem by starting to provide a turnkey solution and ensured that his customers have a seamless experience while doing business with his companies.

He would proudly say he founded and built a family-owned business, meeting and exceeding customers' requirements for over 30 years. In his own words - "Our focus has always been our customers and we go out of our way to ensure that our customers are successful". He ensured every single word was etched in his employees' minds and they worked towards it. The mission of both his companies has always been to ensure energy-efficient, environment-conscious equipment, to be the best in class, and ensure all products are available at its true price. He believed in operating with a sense of social and civic responsibility which drove each and every one of his employees to have a positive impact and give back to our people and environment.. Together with Preetham, father and son duo revolutionized working from home for the industrial vertical focusing on the safety of their employees during the COVID-19 pandemic. Today, the company offers a flexible hybrid model where employees have the opportunity to work from home and come into the office certain days a week allowing them to maintain a healthy work-life balance. He ensured the products always exceeded his customers' expectations and both companies are a testament to his success.








RGS took pride in the culture he built, the value system he put together and lastly, his people - employees, customers, partners and his vendors. He focused on relationships so it was never just a business deal for him. Instead, every project was a testimonial to the value system that RGS carved so beautifully. He passed away on June 1st, 2021 and his demise has left his near and dear ones with a void that can never be filled. He was a long-time member of ASM Chennai chapter, and he served in many roles and supported various ASM activities. He will always be remembered for the lives he impacted through his character and works.



## Total Heat Treatment Solution with International standard

100 % subsidiary of DongWoo HST . Co. Ltd. South Korea

### Industrial Furnaces

-  Batch type (SQF) and Continuous type Carburiizing and Carbonitriding furnace
-  Nitro carburizing furnace
-  Aluminum solution and aging furnace
-  Mesh belt type furnace
-  Vacuum furnace
-  Endogas Generators
-  Other various types of furnace and auxiliary equipment

### Coating Service



### Heat Treatment

- ▶ Process offered
- Carburiizing
  - Carbonitriding
  - Thru- hardening
  - Martempering
  - Nitriding



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Contacts: +91-9566025996, 7358038890, Mail : sk@dws.co.in / ramesh@dws.co.in/ Website: www.dws.co.in



**AMBATTUR HEAT TREATERS PRIVATE LIMITED**

*Building Longterm Relationship*



ISO 9001:2015



IAF 18949:2018

AHTPL has built a strong reputation among its clients for High Quality Heat Treatment Services, Well Equipped Furnaces Setup and Advanced Testing Lab Facilities. AHTPL is handling a variety of components with case depth ranging from 0.05 mm to 2.50 mm. The following are the heat treatment services offered by us.

• Hardening & Tempering • Gas Carburizing • Sub-Zero Treatment • Carbo Nitriding • Annealing • Stress Relieving • Normalizing



AHTPL has set up the state of the art global standard equipment facilities, which include:

- Sealed Quench Furnace (SQF)
- Gas Carburizing Furnace (GCF)
- Rotary Retort Furnace
- Sub-Zero Chamber

#### PLANT I

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Sidco Industrial Estate, Ambatur, Chennai – 600 098.

☎ +91 98408 35500 | +91 98409 35500  
+91 98408 35505 | +91 98408 35514

#### PLANT II

📍 # 7/6, MTH Road (Opp. To Ambattur ITI)  
Industrial Estate, Ambattur, Chennai – 600 058.

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+91 98408 35500





# AMBATTUR METAL TREATERS

*Where service matters*

Case Hardening

**Carburizing**

Nitro Carburizing

**CarboNitriding**

Stress Reliving

**Through  
Hardening**

Normalizing

**Annealing**

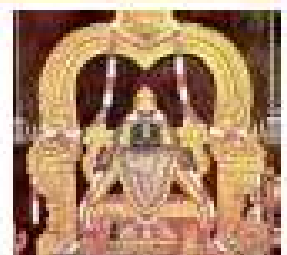


Mobile: 9841035501 [www.amtheat.com](http://www.amtheat.com)

[amtheat@hotmail.com](mailto:amtheat@hotmail.com)

[amfunil1@gmail.com](mailto:amfunil1@gmail.com)

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## Our Major OEM Customers



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senthil@endocomponents.com  
ht@endocomponents.com

### Heat Treatment - Plant-I

No 92/A, Sidco Industrial Estate, Ambattur,  
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+91 98400 02557, 044-26248341

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Endotherm Fluids (India) Pvt Ltd



## Leading Auto-Component Manufacturer & Commercial Heat Treaters

- ✓ Only approved heat treater in Chennai region by Toyota.
- ✓ One among 7 companies in India approved for Heat treatment by Maruti Suzuki.

GROUP OF TECHMAT ENTERPRISES INDIA PRIVATE LIMITED





WE VALUE TESTING

An ISO 17025:2017 laboratory

Now in

- Chennai
- Coimbatore
- Hosur

## 15+ YEARS OF QUALITY TESTING

### Complete Metal Testing Package

#### Metallurgical Tests

- Full fledged scope of tests with advanced microscope (Leica, Zeiss) and software suite
- Team of graduate engineers who have collaborated with industrial sector and major Third Party Inspection Agencies (Lloyd's, BV, NPCIL, DQQA, EIL, ISRO, VSSC etc.)

☐ Determination of heat treatment condition

☐ Graphite type, size, distribution in cast irons / SS irons

☐ Effective Case Depth measurement of case hardened components.

☐ Case depth Measurement by Microscopic Method,

☐ Decarburization

☐ Nitriding depth measurement.

☐ Macro Examination

☐ Inclusion rating / Cleanliness rating

☐ Coating/Plating Thickness Measurement.

☐ Porosity Testing.

☐ Weld evaluations.

☐ Grain flow.

☐ Grain size Determination.

☐ Micro Hardness Testing.

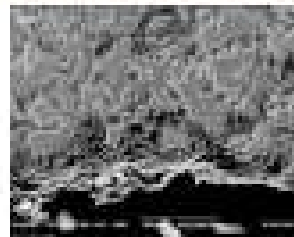
☐ Ferrite counts, volume fraction determinations image analysis

☐ Image analysis

☐ Weld assessments, macro examination/flow itch tests, photography

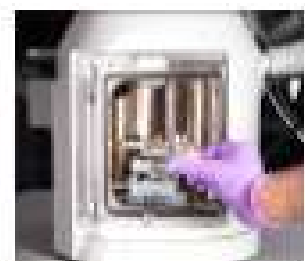
☐ Jominy end-quench test

### Failure Analysis Study



- Root Cause Analysis
- Fracture Study
- Collaboration with client to fine-tune processes and avoid field failures
- Industry: Automotive, Aerospace, Mining, Transport, Manufacturing, Corrosion etc.

### Scanning Electron Microscope



### Corrosion Tests

- Neutral Salt Spray
- Inter Granular Corrosion Tests
- Pitting Corrosion Tests
- Hydrogen Induced Corrosion
- Sulphide Stress Corrosion
- Cyclic Corrosion Tests
- UV and Xenon Weathering Tests

### Mechanical Tests

- UTM's from 10ton to 100ton capacity
- Impact test (up to -196 degC)
- Weld qualification (WPS/PQR)

Fatigue, creep and fracture toughness and others...

### Chemical Tests

- Fe, Ni, Co, Cu, Al, Ti, Zn base alloys can be tested
- RoHS tests
- OES, ICP-OES, GC-MS
- Dyes and Minerals analysis
- Cement & water testing

- 2 SEM instruments to handle range of samples and load
- With EDX attachment for point-wise chemical characterisation
- Precipitate analysis
- Up to 10,00,000x magnification

### PAINT, RUBBER AND PLASTICS TESTING

- Full-fledge lab supporting non-metals
- Physical and Chemical properties evaluation
- Comply to ASTM specifications, and automotive specs.

CONTACT US:

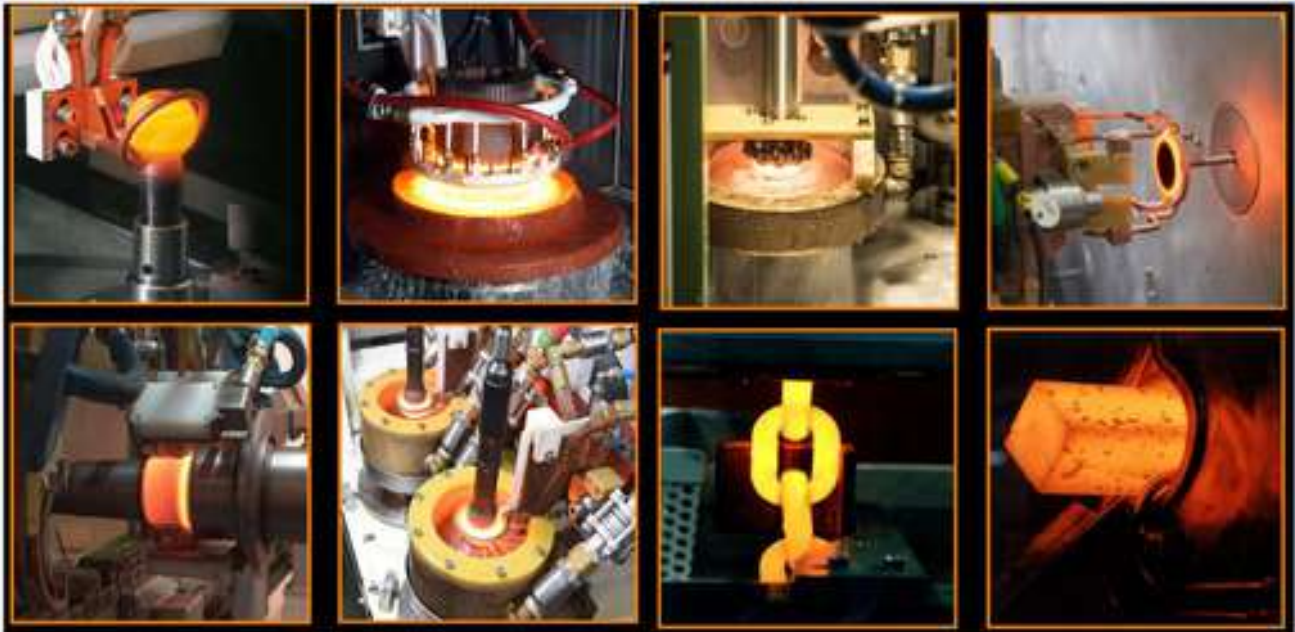
Email: [cre@microlabchennai.com](mailto:cre@microlabchennai.com) [sb@microlabchennai.com](mailto:sb@microlabchennai.com)

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Fax: 044-2478 0042 / 4398 4700  
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**ASM**  
INTERNATIONAL

CHENNAI CHAPTER



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Heat Treatment &  
Surface Engineering  
Conference & Expo 2023

# **4<sup>th</sup> CONFERENCE & EXPO HEAT TREATMENT & SURFACE ENGINEERING**

**INDIA'S LARGEST**

# **EXPO**

**2023 | September  
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# ABOUT



ASM International is the world's largest association of materials engineers and scientists, dedicated to informing, educating, and connecting the materials community to solve problems and stimulate innovation around the world.

As the world's largest and most established materials information society, ASM engages and connects the professionals to a global network of peers and provides access to trusted materials information through reference content and data, education courses, international events, and research.

The society is serving as an engineering and scientific community, "led by its members, guided by the members need and fuelled by members participation. ASM International 30000+ members worldwide, connected to Materials community as Engineers, Managers, Scientists, Equipment manufacturers and Suppliers. The society consists of 100 + professional and student chapters in 85 countries around the world. Members work primarily with metals, but also with Structural Polymers, Ceramics and Composites. Nearly 20 awards are presented yearly, to individuals and organizations, for their outstanding achievements in the materials industry, which include the Distinction of ASM Fellow, bestowed on individuals for their outstanding contributions in Material Science and Engineering. (For more detail visit [www.asminternational.org](http://www.asminternational.org))

## ASM INTERNATIONAL CHENNAI CHAPTER

ASM International Chennai chapter (ASMICC) was inaugurated on the year 1985 and led by various stalwarts by contributing to the chapter through conducting various programs. Chennai chapter was duly recognized by the ASM Head Quarters with the prestigious Chapter Excellence Award in the year 2000-2001, the First Award of its kind given to a chapter outside USA. The Chennai Chapter has received many five star and chapter awards for several years recognizing its outstanding activities. The Chennai Chapter of ASM International provides tailor made in house courses to suits specific organizations and updating latest developments by technical lectures, Courses, National & International seminars and workshops (for more detail Visit [www.asmchennaichapter.com](http://www.asmchennaichapter.com))

## FOURTH HT & SE 2023

The three-day Conference and Expo on Heat Treatment and Surface Engineering will host about **500+ delegates** from India and Abroad. More than **150+ high quality technical papers** are expected to be presented at the conference. Over 5000+ business visitors are expected for the conference and expo. The event includes various plenary and keynote speakers from Different parts of the world. The event will be **co-organized and sponsored** by leading industries, companies, government organizations and professional associations from India and abroad. There will be a **workshop series** on the theme of advanced material, special heat treatments and innovative surface treatments.

## ORGANISING COMMITTEE

### CHAIRMAN

**Dr. U. Kamachi Mudali**

Trustee : ASM INTERNATIONAL  
Honorary Prof of Practice : IIT MADRAS  
Vice Chancellor : IIT BHOPAL UNIVERSITY

### CO-CHAIR CONFERENCE

**Prof. M. Kamaraj**

Indian Institute of Technology Madras

### CO - CHAIR EXHIBITION

**N. Sampathkumar**

MD, Ambattur Metal Treathers

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Director, Ambattur Heat Treathers

#### TREASURER

**R.J.Venkatesh**  
Savita Oil Technologies



# WHY HT&SE ?

## CONNECTING BUYERS - PROFESSIONALS - ATTENDEES

The objective of HTSE 2023 is to bring together industry professionals, senior executives, managers, engineers and researchers, heat treatment Professionals, tool makers and users, suppliers of heat treatment and surface engineering plant and equipment, as well as academicians from and all over the world. The Conference and exhibition are aimed to create an opportunity for display and exchange of technical information and updates at an international level among the specialists involved in heat treatment and surface engineering.

## BENEFITS FOR STUDENT/YOUNG PROFESSIONALS

Research Students, Young professionals pursuing / working in Manufacturing and Metallurgy will have an opportunity to meet major players in heat treatment and surface engineering world. Expo floor will have displays and hands on demonstration, which will allow glimpse to latest technologies.

## EXHIBITOR PROFILE

- Advanced Heat Treatment Processes and Furnaces.
- Commercial Heat Treating Services.
- Conversion coatings.
- Heat Treat Processing Compounds and Solutions.
- Heat Treat Processing Controls and Instrumentation.
- Industrial Heat Treatment Process Materials.
- Machining and Metal Cutting Equipment.
- Material stamping, forging, castings etc.
- Material processing and Components manufacturing.
- Material testing/Characterisation Equipment Services and Supplies.
- Metal Forming Equipment.
- Nano and Advanced coatings.
- Plating and Painting Protection.
- Plants and machineries.
- PVD and CVD coating s
- Steel and Alloy making
- Surface modifications and coatings
- Surface Treating, Shot blasting, Burnishing and Pickling.
- Surface Analysis Cladding and Hard Facing
- Thermal spraying
- Thermal Processing of Non-Metals (ceramics, polymers & composites)
- Welding and Joining Equipment
- Wear and Corrosion Resistant Coating s

## VISITOR PROFILE

### MANUFACTURERS OPERATIONAL AND MAINTENANCE PERSONNEL FROM:

Aerospace, Automotive, Auto components, Industrial Furnace, Iron & Steel, Mining & Construction Equipment, Material handling and Earth Moving Machinery and Equipment, Railway Coaches, Army Tanks, Aircraft and Aerospace parts, Process Control, Testing and Measuring Instruments, Heat Treatment Processing Chemicals, Quenching Oils and more and Suppliers to OEM

Bridges, Roads, Tunnels, Buildings, Ship Building, Coal Mines, Cement Plants, Ceramic and Chemical Industries, Nuclear and Hydro Power Projects and more.



***ABOVE LIST IS ONLY INDICATIVE BUT NOT EXHAUSTIVE!***



# CALL FOR PAPERS

## ABSTRACT

Abstracts submitted for consideration should include at least 250 words with full particulars such as the topic for which the paper is being submitted, the proposed title, conclusions, significance of the paper, and details of author and co-authors(s) with names, company, affiliation, complete address, and e-mail address •

## FINAL MANUSCRIPT

Please visit the official website [www.asm-htse.com](http://www.asm-htse.com) for more information. Full-Length papers will be requested after abstract acceptance and selected papers presented will be published as a conference proceeding. Speakers should register in advance to present in the conference. The official language of 4<sup>th</sup> HTSE Expo and Conference 2020 will be English. Guidelines and details will be made available at the website.

## IMPORTANT DATES

Last Date for abstract submission: 30<sup>th</sup> April 2023

Intimation of acceptance of abstract: 31<sup>st</sup> May 2023

Submission of final manuscripts: 15<sup>th</sup> July 2023

Last date for registration (Author Registration with copyright to confirm papers for Proceedings): 15<sup>th</sup> August 2023

**Please send your abstracts to:** [conf@asm-htse.com](mailto:conf@asm-htse.com)

For further details contact

**G. S Shankar (Heat Treatment)**

Engineering Manager,  
Caterpillar India Pvt Ltd  
Mail: [subburathinam\\_shankar@cat.com](mailto:subburathinam_shankar@cat.com)  
Phone: +91 99623 52227

**Prof. Srinivasa Rao Bakshi (Surface Engineering)**  
DEPT OF METALLURGICAL AND MATERIALS ENGINEERING  
IIT Madras

Mail: [conf@asm-htse.com](mailto:conf@asm-htse.com)  
Phone: +91 94449 03710

## Abstracts are currently being solicited for (but not limited to) the following topics

- Additive Manufacturing and Powder Metallurgy
- Applied Technology / Processes and Applications
- Automotive Light weighting
- Carburizing, Nitriding, Nitro carburizing and post oxidation
- Coatings and Surface Modification
- Composite Materials & Structures
- Emerging and Sustainable Materials & Processes
- Electro and Electroless Plating
- Failure Analysis
- Forming and Thermo mechanical Processing
- Functional and Aesthetic coatings
- Furnaces, Inspection & Testing, Control of defects
- Gas and Plasma Nitriding
- Heat Treatment Principles, Process Control & Atmosphere
- Heat treatment of Ferrous and Non-Ferrous alloys
- Heat Treatment Problems and Trouble shooting
- Induction Heating and applications
- Low Temperature Surface Hardening of Stainless Steel
- Organic and Inorganic Paints
- Quenching Media and Distortion Control
- Residual stress
- Sol-Gel Coatings
- Surface Engineering Applications
- Vapour Deposition Techniques
- Vacuum Processes and Technology
- Welding & Joining

# PARTICIPATION

## SUPPORT OPPORTUNITIES

Booths Delegates,  
USD with 18% GST

Category	Included benefits	Rate (INR)	Inclusive of GST (INR)	Rate in USD
<b>Platinum</b>	<ul style="list-style-type: none"> <li>Logo in website , conference souvenir, exhibition directory, backdrop in conference hall, exhibition invitation</li> <li>2 page profile in conference souvenir, 2 full page advt. in exhibition directory</li> <li>36 SQM booth</li> <li>Free registration for 5 delegates</li> </ul>	10,00,000	11,80,000	23600
<b>Gold</b>	<ul style="list-style-type: none"> <li>Logo in website , conference souvenir, exhibition directory, backdrop in conference hall, exhibition invitation</li> <li>1 page profile in conference souvenir, 1 full page advt. in exhibition directory</li> <li>18 SQM booth</li> <li>Free registration for 4 delegates</li> </ul>	5,00,000	5,90,000	11800
<b>Silver</b>	<ul style="list-style-type: none"> <li>Logo in website , conference souvenir, exhibition directory, backdrop in conference hall, exhibition invitation</li> <li>1 page profile in conference souvenir, 1 full page colour advt. in exhibition directory</li> <li>12 SQM booth</li> <li>Free registration for 2 delegates</li> </ul>	3,00,000	3,54,000	7080
<b>Lunch / Dinner / Cultural</b>	<ul style="list-style-type: none"> <li>Logo in website, full page colour advt. in conference souvenir, full page colour advt. in exhibition directory</li> <li>9 SQM booth</li> <li>Free registration for 2 delegates</li> <li>In dining area during lunch</li> </ul>	2,00,000	2,36,000	4720
<b>High tea Technical session</b>	<ul style="list-style-type: none"> <li>Free registration for 1 delegate</li> <li>1 advt. display in technical session.</li> </ul>	1,00,000	1,18,000	2360

## EXHIBITORS

Category	Included benefits	Rate (INR)	Inclusive of GST (INR)	Rate in USD
<b>12 Sq.m</b>	<ul style="list-style-type: none"> <li>12 Sq.m (3M x 4M) booth</li> <li>2 delegates registration provided</li> <li>1 full page profile in exhibition Directory</li> </ul>	1,50,000	1,77,000	4720
<b>9 Sq.m</b>	<ul style="list-style-type: none"> <li>9 Sq. m (3M x 3M) booth</li> <li>2 delegates registration provided</li> <li>1 full page profile in exhibition directory</li> </ul>	1,12,500	1,32,750	3540

### Note:

- Booth space is also available in multiples of 12 and 9 Sq.m.
- Each booth is provided with a desk, 2 chairs, spotlight and stall facia
- Early bird discount of 10% is available with full payment on or before **31<sup>st</sup> May 2023**



# PARTICIPATION

## ADVERTISEMENT IN SOUVENIR

Foreign, USD with 18% GST

Type	Category	Rate (INR)	Inclusive of GST (INR)	Rate in USD
Advertisement	Back cover – colour	50,000	59,000	1180
	Front / Back inside cover – colour	40,000	47,200	944
	Full page - colour	25,000	29,500	590
	Half page - colour	15,000	17,700	472

A souvenir will be published to commemorate the event. This will carry articles by eminent experts on contemporary topics related to the conference and information about sponsors, exhibitors, advertisements etc. This will be widely circulated to academic and research institutions, professional societies, Government bodies and Industrial establishment in India and abroad.

## DELEGATE REGISTRATION

Type	Category	Rate (INR)	Inclusive of GST (INR)	Rate in USD
Delegates	Individual	15,000	17,700	590
	ASM / Government Organizations / Academic Institutes / Contributory Authors	12,000	14,160	472
Student	Individual	5,000	5,900	118
	MA CHAPTER MEMBER / ASM Student Members	3000	3000	59

## REGISTRATION INCLUDES

Conference souvenir.  
Technical events.  
Conference Kit.  
Lunches and Banquet Dinner during the conference.  
Cultural programs

## PAYMENT OPTIONS

Online payment.  
Bank transfer.  
Cheque / DD. – In favour of  
"ASM INTERNATIONAL CHENNAI CHAPTER"  
For any queries contact: [admin@asm-itsc.com](mailto:admin@asm-itsc.com)

## BANK DETAILS

ACCOUNT NAME	ASM INTERNATIONAL CHENNAI CHAPTER
ACCOUNT NUMBER	032494600000404
BANK NAME	YES BANK
BRANCH	ANNA NAGAR, CHENNAI – 600 102
MICR CODE	600532006
IFS CODE	YESB0000324
SWIFT CODE	YESBINBB



# PAST CONFERENCES AND VENUE

## HTSE 2013



ASM International – Chennai Chapter organized India's First International Conference & Exhibition on Heat Treatment and Surface Engineering 2013 (HT&SE 2013) during May 16-18, 2013 at Chennai Trade Centre, Chennai, India.

Three - day International Conference on Heat Treatment and Surface Engineering (Including the popular series 27<sup>th</sup> Surface Modification Technologies - SMT 27) hosted around 300+ delegates from India and abroad. More than 65+ high quality technical papers and 50+ exhibitors were presented at the Conference.

## HTSE 2016



2nd HEAT TREATMENT AND SURFACE ENGINEERING & AUTOMOTIVE MATERIALS AND MANUFACTURING Conference and Expo 2016, Chennai Trade Centre during May 12 – 14, 2016

Three - day International Conference and Expo on Heat Treatment and Surface Engineering hosted 500+ delegates from India and Abroad. More than 100+ high quality technical papers and 60+ exhibitors were presented at the conference. Over 3000+ business visitors were at the conference and expo.

## 6<sup>th</sup> ACHTSE 2020

### 6ACHTSE 2020

#### 6<sup>th</sup> ASIAN CONFERENCE & EXPO ON HEAT TREATMENT AND SURFACE ENGINEERING



Thee three-day 6th Asian Conference and Expo on Heat Treatment and Surface Engineering hosted about 400+ delegates from India and Abroad. More than 140+ high quality technical papers were presented at the conference and over 5000+ business visitors attended the Expo. The conference featured 13 Keynote Lectures, 53 Invited Lectures, 27 Contributory Lectures and 44 Technical Posters spanning several areas such as advances in carburizing, carbo-nitriding, gas nitriding, plasma nitriding, vacuum heat treatment, gas sensors, advanced quenchants, thermal spray coatings, solution and suspension precursor thermal spray coatings, CVD and PVD coatings, electro- and electroless plating, biomedical coatings, to name a few. Sixty-four (64) presenters were from Industry and research organizations, while 29 were from academia. There were 14 presentations by woman delegates and we hope to have increased women participation in the future conferences. The delegates were represented from countries such as USA, Belgium, Hungary, Spain, Germany, Romania, Ireland, UK, Canada and host India. The conference was supported by 15 sponsors in the Platinum, Gold and Silver categories. The exhibition featured 46 industries from reputed Indian and overseas manufacturers of Furnaces which include Vacuum HT, induction heating equipment, Plasma nitriding, Nitrocarburizing, Sintering, Process control Instruments, Furnace accessories, High alloy fixtures, Heat treatment Service Providers, Metal Powders and Metallography & Testing equipment manufactures in addition to Specialty Quenching Media manufactures.



## PAST CONFERENCES AND VENUE

### HTSE 2013



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Three - day International Conference on Heat Treatment and Surface Engineering (Including the popular series 27<sup>th</sup> Surface Modification Technologies - SMT 27) hosted around 300+ delegates from India and abroad. More than 65+ high quality technical papers and 50+ exhibitors were presented at the Conference.

### HTSE 2016



2nd HEAT TREATMENT AND SURFACE ENGINEERING & AUTOMOTIVE MATERIALS AND MANUFACTURING Conference and Expo 2016, Chennai Trade Centre during May 12 – 14, 2016

Three - day International Conference and Expo on Heat Treatment and Surface Engineering hosted 500+ delegates from India and Abroad. More than 100+ high quality technical papers and 60+ exhibitors were presented at the conference. Over 3000+ business visitors were at the conference and expo.

### 6<sup>th</sup> ACHTSE 2020

### 6ACHTSE 2020

### 6<sup>th</sup> ASIAN CONFERENCE & EXPO ON HEAT TREATMENT AND SURFACE ENGINEERING

15 - 17 March 2020 CHENNAI TRADE CENTRE CHENNAI, INDIA



The three-day 6th Asian Conference and Expo on Heat Treatment and Surface Engineering hosted about 400+ delegates from India and Abroad. More than 140+ high quality technical papers were presented at the conference and over 5000+ business visitors attended the Expo. The conference featured 13 Keynote Lectures, 53 Invited Lectures, 27 Contributory Lectures and 44 Technical Posters spanning several areas such as advances in carburizing, carbo-nitriding, gas nitriding, plasma nitriding, vacuum heat treatment, gas sensors, advanced quenchants, thermal spray coatings, solution and suspension precursor thermal spray coatings, CVD and PVD coatings, electro- and electroless plating, biomedical coatings, to name a few. Sixty-four (64) presenters were from industry and research organizations, while 29 were from academia. There were 14 presentations by woman delegates and we hope to have increased women participation in the future conferences. The delegates were represented from countries such as USA, Belgium, Hungary, Spain, Germany, Romania, Ireland, UK, Canada and host India. The conference was supported by 15 sponsors in the Platinum, Gold and Silver categories. The exhibition featured 46 industries from reputed Indian and overseas manufacturers of Furnaces which include Vacuum HT, Induction heating equipment, Plasma nitriding, Nitrocarburizing, Sintering, Process control Instruments, Furnace accessories, High alloy fixtures, Heat treatment Service Providers, Metal Powders and Metallography & Testing equipment manufacturers in addition to Specialty Quenching Media manufacturers.



# About Chennai



Chennai is the capital of Tamil Nadu and is India's fourth largest metropolitan city, the third largest economy and the second most industrialised state in south India. Chennai has a diversified economic base covering sectors like automobile, light engineering, textile, petrochemicals, leather, heavy engineering, defence, space, nuclear, etc. Chennai is the automotive capital of India and often referred as the Detroit of Asia with major automobile giants having their manufacturing hub here. Recent estimates of the economy of the Chennai Metropolitan Area is around US\$79 to \$6 billion, \$200 billion with industrial zones; PPP GDP, ranking it from fifth most productive metro area of India, and the third highest by GDP per capita. Chennai has a market share of around 30% of India's automobile industry and 35% of its auto components industry. At current prices, Tamil Nadu's gross state domestic product (GSDP) is estimated to be Rs. 24.85 trillion (US\$ 320.27 billion) in 2022-23. The state's GSDP increased at a CAGR of 11.27% between 2015-16 and 2022-23. The state introduced the 'Industrial Policy 2021' to achieve an annual growth rate of 15% in the manufacturing sector while attracting investments worth Rs. 10 lakh crore (US\$ 137.8 billion) and creating employment opportunities for 20 lakh people by 2025. Tamil Nadu ranked first in terms of foreign tourist arrival and second in terms of domestic tourist arrival in 2019. Chennai is Journey into timeless India, a kaleidoscope of moods, rich in treasures of history, from temples and shrines to forts and palaces, the landscape of the past merging easily with the present retaining much of its traditional charm, this 350-year-old city is the gateway to south India. San Thome Basilica, St Mary's church, Government Museum, Kapaleeshwar temple, Parthasarathy temple are some of the many sights in Chennai. HT&SE 2023 conference and expo will take place in Chennai Trade Centre, one of the most modern and state-of-art exhibition Centres in India.

## About Venue



**Chennai Trade Centre**

**Mount Poonamallee High Road, Nandambakkam, Chennai - 600 089**

Refer [www.chennaitradecentre.org](http://www.chennaitradecentre.org)



