Program Schedule

DAY 1 - 29th May - 9:00 AM - 12:00 Noon

I. Introduction to Nanomaterials
1. Nanotechnology
- History of nanotechnology
- Material property charts and role of nanomaterials
- Nanoscience vs nanoengineering

2. Classification of nanomaterials
- 0 D, 1 D, 2 D, 3 D
- Nanomaterials

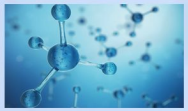
Overview of current nanomaterial systems to include Fullerenes, Carbon Nanotubes (CNTs), Nanowires, Nanocluster, Nanoparticles, Nanocrystals, Quantum dots, Dendrimers, Nano clays

II. Nanomaterials Fundamentals
1. Reasons for distinctive properties of nanomaterials
1.1 Enormous surface to volume ratio
1.2 Large fraction of surface atoms
1.3 Large surface energy
1.4 Spatial confinement

2. Spontaneous surface energy reduction
2.1 Atomic and surface level
2.2 Individual nanostructure level
2.3 Overall system level: Combination and Agglomeration

III. Conventional Composite Materials
1. Introduction, types of composites
2. Properties
3. Different types of fibers and matrix and their roles
4. Micromechanics, Micromechanics
5. Textile composites
6. Failures in composites – Fatigue, Impact, Inter-laminar failures
7. Need for Nanoengineered Composites

2:00 PM – 5:00 PM



IV. Nanoprocessing
1.1 Introduction
1.2 General approaches for nanoprocessing
1.3 Challenges of nanoprocessing
2. Characterization and manipulation at nano-scale
2.1 Importance of characterization in nanoprocessing
2.2 Characterization techniques
2.3 Electron microscopes

3. Synthesis and processing 0D nanostructures – nanoparticles
3.1 Introduction
3.2 Synthesis of nanoparticles through homogeneous nucleation

4. Synthesis and processing 1D nanostructures – nanowires/nanorods/nanotubes/nanofibers
4.1 Top-down and bottom-up techniques
4.2 Bottom-up growth

5. Electrospinning
5.1 Introduction
5.2 Manufacturing of glass nanofibers
5.3 Manufacturing of carbon nanofibers

Day 2 - 30th May - 9:00 AM - 12:00 Noon

V. Introduction to Nanocomposites
1. Polymer Nanocomposites
2. Ceramic Matrix Nanocomposites
3. Metal Matrix Nanocomposites

VI. Conventional Composite Manufacturing Methods
1. Thermoplastic and Thermoset Composite Processing Overview
2. Hand layup
3. Open molding
4. Resin infusion process – Resin transfer molding (RTM)
5. Vacuum assisted resin transfer molding (VARTM)
6. Prepreg and autoclave
7. Compression molding, injection molding
8. Filament winding, pultrusion
9. Integration of nanomaterial constituents in resin infusion composite processing

VII. Additive Manufacturing
1. Overview of additive manufacturing techniques to include Stereo lithography; Fused deposition molding; PolyJet Material Jetting
2. Current state and limitations
3. Digital Designs and PolyJet Method

2:00 PM – 5:00 PM

VIII. Nanomechanics
1. Prediction of fundamental properties of three phase composites
2. Nanoengineered Laminate Analysis

IX. Nanomaterials in Automotive Applications:
1. Nanofluids
2. Automobile tires
3. Nanoengineered textiles – antimicrobial, wear resistant etc.
4. Emission Systems

Program Schedule

Day 3 - 31st May - 9:00 AM - 12:00 PM

X. Nanomaterials in Aerospace Applications
1. Nanoengineered prepregs manufacturing
2. Tribological and anticorrosion coatings
3. Lightning strike protection
4. Space radiation protection using nanomaterials

XI. Microvascular Sections and its Applications in Future Electric Vehicles
1. Manufacturing method for microvascular composites
2. Use of microvascular composites in future electric vehicles.

XII. After Lunch : Industry Visit

Participants will be taken to an Industry site in Bengaluru.

Who Should Attend ?

* Practicing Engineering in Automotive & Aerospace Companies in the area of lightweighting, structural materials, mechanics and design, sensors, chips, component with enhance performance characterises.

* Aero Engines in the area of Nanocomposites.

* Service providers who have aerospace clients / projects in the area of composites, weight reduction, greener aerospace technology.

* Line Managers & Projects Mangers in the above areas, research scientists and engineers in the above areas.

* Technology Development groups, Research Organisations, post graduate, masters's and Ph.D. scholars and doctorate professors.

Participants are advised to bring in their laptop as we will have hands on sessions

Registration Fee

Professional Member : INR 20000 +3600 GST 18% = 23600/-

Faculty Member : INR 10000 +1800 GST 18% = 11800/-
(MS and Ph.D. scholars)

Non-Members : INR 25000+ 4500 GST 18% = 29500/-

Discounts for bulk registrations: 10 % Discount for more than three from same organisation

Regsitration Link:

https://forms.gle/4h16cNbGgJuHAip29

RSVP : S. Ilangovan / Mob: 8870471511
Email id: pdp@saeindia.org

Benefits

* Exposure to advanced nanomaterial concepts and applications of Nanoengineered materials, techniques in Nanoscience / Nanoengineering (NS / NE).
* Refresher course on fundamentals in NS / NE.
* Get to know the facilities available JSNN (Link http://jsnn.ncat.uncg.edu/) in the area of NS / NE.
* Peer discussion about India-Specific facilities in NS / NE and technical collaborations.
* Hands-on experience in one of the software package in NS / NE for nanoengineered material property evaluations.

You can become an SAEINDIA Professional member by paying Rs: 1400 (+ GST 18%) through https://www.saeindia.org/member-login/
* Annual Membership fee

Speakers

Dr. Ajit Kelkar, *Professor and Chairman, Nanoengineering, Interim Director, Center of Excellence for Advanced Manufacturing, North Carolina A&T State University, Joint School of Nanoscience and Nanoengineering*

Dr. Ajit D. Kelkar is a Professor and Chair of Nanoengineering Department at Joint School of Nanoscience and Nanoengineering. He also serves as Interim Director for the Center of Excellence for Advanced Manufacturing. For the past twenty-five years, he has been working in the area of low cost fabrication, processing and performance evaluation and modeling of polymeric and ceramic matrix composites. He has worked with several federal laboratories in the area of fatigue, impact and finite element modeling of woven composites including US Army, US Air force, NASA-Langley Research Center, National science Foundation, Office of Naval Research, FAA and Oak Ridge National Laboratory. Presently he is involved in the development of nano engineered multifunctional materials using CNTs, BNNTs and electrospun fiber materials for aerospace and automotive applications.

He has published over two hundred fifty papers and has edited two books in the area of Nanotechnology. He has received three patents and has filed for twelve invention disclosures. He is recipient of numerous awards including Senior Researcher Award, Intellectual Property Award at North Carolina A&T State University, BEYA Stem Innovation Award. He is a Fellow of Maharashtra Academy of Science, India. He serves on editorial board for three journals in nanotechnology areas. He is a member of several professional societies including ASME, SAMPE, AIAA, ASM, MRS, and ASEE.

Dr. Ram V. Mohan, *Professor Nanoengineering, North Carolina A&T State University, Joint School of Nanoscience and Nanoengineering*

Dr. Mohan is currently a professor of Nanoengineering in the Department of Nanoengineering, at North Carolina A&T State University (NCAT) leading computational nanoengineering research. He is also an Adjunct Professor of Nanoscience at Joint School of Nanoscience and Nanoengineering. Dr. Mohan's research and educational activities have been continually funded over the years by several US federal agencies, defense industries and private organizations. Over the years at NCAT, building upon his core research field of mechanics and materials, Dr. Mohan has led and established new research directions and capabilities, which includes Additive Manufacturing (AM) for hierarchical material developments and research investigations. He is recipient of 2012 University Senior Researcher Award and 2017 Interdisciplinary Team Research Award at NCAT. Dr. Mohan has a clear understanding and vision for interdisciplinary, system of systems solutions needed for complex problems based on his educational and research upbringing and philosophy.

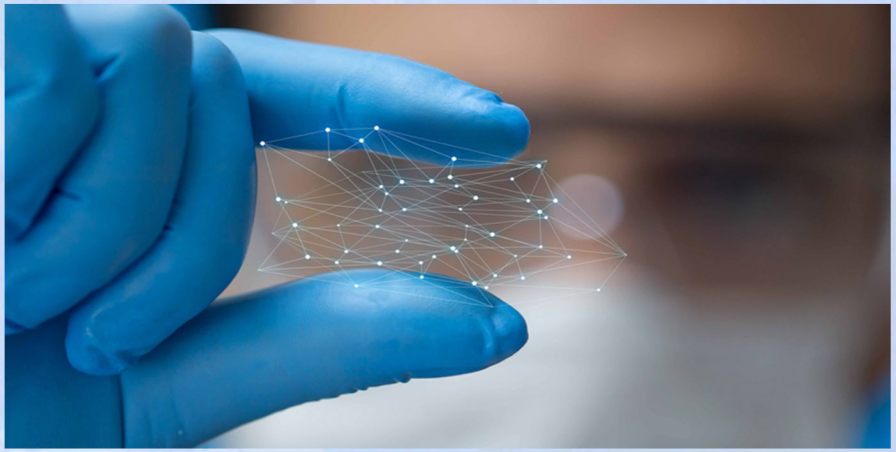
Dr. Mohan has more than peer reviewed journal articles, book chapters, and conference proceedings to his credit to date. Prior to NCAT, he served as a composites materials expert for NASA National Center for Advanced Manufacturing at University of New Orleans; as a resident research scientist with U.S. Army Research Laboratory (ARL). Dr. Mohan holds a Ph.D. in Mechanical Engineering from University of Minnesota, a M.S. in Theoretical and Applied Mechanics from University of Illinois at Urbana-Champaign. His computational methods for physics based flow modeling of composite material processes evolved into DOD scalable parallel simulation analysis software for liquid composite molding (LCM) processes; provided modeling and simulation analysis capabilities to various advanced composite prototype developments for the department of defense. Dr. Mohan's research in his foundational core of mechanics and materials, contributions and interests include the areas mechanics, materials, and computational modeling of nanoengineered material systems, modeling of bio and nano systems, interfaces, and interactions; computational mechanics, nanomechanics, and material sciences; transport phenomena in composite material processing; uncertainties and process optimizations, experimental investigations for LCM processes; high performance scalable computing, engineering product visualization; engineering education.

Dr. Mohan is an invited and keynote speaker at several international conferences, universities, research laboratories, and industries in US, Europe, India, Brazil, Taiwan, S. Korea, Malaysia, and several other countries. Dr. Mohan also holds a visiting professorship with University of Malaysia, Pahang. His industrial interactions include Lockheed Martin-Manassas, Boeing-Mesa, Northrop Grumman, Boeing-St. Louis, Lockheed Martin-Skunk Works, General Dynamics and VX Aerospace. Dr. Mohan plays an active role in American Society for Mechanical Engineers (ASME) where he initiated and served as the Track Chair for Materials: Genetics to Structures Track at the 2014, 2015 ASME International Mechanical Engineering Congress and Exposition; Chair of the ASME materials processing technical committee, and is currently serving in the executive leadership as chair for nanoengineering council. He is a member of American Society of Aeronautics (AIAA), American Society for Engineering Education (ASEE), and Society for Advancement of Materials and Process Engineering (SAMPE); regularly presents, organizes and conducts seminars and conferences for these professional and engineering organizations in US and around the world.

SAEINDIA
Society of Automotive Engineers INDIA

SAEINDIA
Bengaluru Section

Nano-Engineered Materials for Aircraft and Auto Applications



29th - 31st May 2019, Bengaluru

Speakers

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Professor and Chairman
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Center of Excellence for Advanced Manufacturing
North Carolina A&T State University
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Dr. Ram V. Mohan
Professor, Nanoengineering
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Venue:
Bengaluru, Karnataka