National Institute of Technology Silchar
(An Institute of National Importance by MHRD, Govt. of India)
Silchar, Assam – 788 010
GIAN: Global Initiative of Academic Networks
An Initiative of
Ministry of Human Resource and Development
(Government of India)

# Surface Engineering

## Overview

Surface Engineering pervades the entire gamut of engineering applications and is one of the primary methods for combating wear, corrosion, lubrication and other degradation phenomena. Life extension and maintenance are therefore key issues in all industry sectors involved in manufacturing. The primary objective of this course is to provide an overview of all the available processes and treatments that can be used commercially for various substrates and applications. We will discuss vapor deposition processes, electroplating, ion and laser beam processes and numerous other surface hardening processes. In addition, we will have a special section on the new field of nanomaterials and how this impacted every aspect of the coatings technology by significantly enhancing the value to the end user. Attendees will be able to have an appreciation at the end of the course of the advantages and disadvantages of the various methods and a real world appreciation for the available coatings and methods along with some typical applications. New opportunities for research exploration may also become viable for many students and faculty in areas of their interest.

Course participants will learn these topics through lectures. Also case studies and assignments will be shared to stimulate research motivation of participants.

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| **Dates** | **13th September to 17th September 2016** | |
| **Place** | **Department of Mechanical Engineering, National Institute of Technology, Silchar, Assam, India** | |
| **Modules** | Historical perspectives and significance of surface treatment technology – | 1.5 hr |
| | Basics of nanomaterials and applications in coatings in electronics, structural, optical and aerospace – | 2 hrs |
| | Cleaning and surface preparation – | 1 hr |
| | Gas Diffusion processes - Carburizing, Nitriding, Carbonitriding, Boriding, Siliconizing – | 1.5 hrs |
| | Electroplating and its Applications - Environmental Considerations – | 2 hrs |
| | Mechanical Vapor Deposition - Pulsed Electrode Surfacing and Applications – | 1 hr |
| | PVD - Ion Plating, Ion Sputtering, Ion Implantation, Ion Evaporation and Applications – | 2 hrs |
| | Chemical Vapor Deposition and Infiltration with Applications - | 1 hr |
| | Plasma,Thermal Spraying, Cold spraying and their applications – | 3 hrs |
| | Sol-gel methods - Dip and Spray Coatings – | 1hr |
| | Diamond, Diamond like Carbon and carbonitride compounds – | 1hr |
| | Superhydrophobic/omniphobic coatings - | 1 hr |
| | Characterization techniques for coatings including nanoindentation and residual stress measurements – | 2 hrs |
| | Wear, corrosion and oxidation – | 2 hrs |
| | Other industrial applications of coatings – | 2 hrs |

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| | **NUMBER OF PARTICIPANTS FOR THE COURSE IS LIMITED TO FIFTY (50)** |
| **Who can Participate** | Undergraduate students, post graduate students, design engineers, materials engineers, chemical engineers, R&D personnel, process engineers, mechanical or manufacturing engineers, product managers and others who want to learn the fundamentals of surface engineering will all benefit substantially from the 35 years of expertise of the instructor. |
| **Fees** | The participation fees for taking the course is as follows:<br>**Participants from abroad : US $500**<br>**Industry/ Research Organizations: INR 10,000**<br>**Academic Institutions (Faculty): INR 5,000**<br>**Academic Institutions (Students) : INR 1,000**<br>The above registration fee is towards instructional materials, working lunch, light refreshments etc. The outstation participants may be provided with twin sharing accommodation on payment basis in Institute Guest House if available. |
| **Benefits from the course** | The participants Will:<br>• Understand the basics of wear, corrosion and oxidation<br>• Learn how to use analytical techniques to investigate problems including modeling<br>• Review the major processes used in industry for reducing wear, corrosion and oxidation<br>• Better understand the limitations of "standard" materials and how they can be improved with surface engineering<br>• Make objective comparisons between processes, free of commercialism<br>• Learn to identify the surface treatment best suited to a particular application<br>• Learn whether to change materials for a component or apply a surface treatment<br>• Learn how to evaluate the cost effectiveness of various surface treatment technologies<br>• Understand the capabilities of recent processes such as jet vapor deposition, diamond-like carbon, plasma-based ion implantation, cold spraying and superhydrophobic/omniphobic coatings<br>• Discover how to improve manufacturing productivity and product quality |

## The Faculty

Dr. T. S. Sudarshan is currently the President and Chief Executive Officer for Materials Modification Inc., (MMI) Fairfax, Virginia. Prior to this he worked as the Director for Research and Development at Synergistic Technologies, Maryland developing self-lubricating coatings for cutting tools and weapon systems before the company was acquired by Dupont Ventures. In his early career, he has also worked as a Senior Metallurgist at Ashok Leyland, Madras. He has raised over 45 million dollars in funding from the Government for high risk high payoff advanced technology related programs. Dr. Sudarshan was a member of the "National Materials Advisory Board" of the National Research Council that directs policy and provides important input to Congressional initiatives regarding materials science, holder of 24 patents worldwide, winner of the Outstanding Manufacturing Engineer award given by the Society of Manufacturing Engineers – USA, Fellow of ASM International, Fellow of International Federation of Heat Treatment and Surface Engineering, Fellow of IMMM, Distinguished Alumni IITM, coauthor of over 175 papers in journals and peer reviewed conferences, coeditor of 35 books in surface engineering, and books on "Rapid Solidification Technology", Intermetallic and Ceramic Coatings", "Chemical Vapor Deposition" and "Additive Manufacturing". He is also the founder of the "Surface Modification Technologies" conference that has been held for the past 30 years in various countries that include USA, UK, France, Japan, Singapore, Switzerland, India, Austria, Sweden, Germany, Finland, Denmark and Italy and serves on the editorial boards of several international journals. Dr. Sudarshan is also the Co-editor of two international peer reviewed journals "Materials and Manufacturing Processes" published by Taylor and Francis for the past 29 years and "Surface Engineering" published by Maney Publishing on behalf of IOM, UK for the past 19 years. In addition, Dr. Sudarshan has served as a mentor for several high school and coop students and is a member of numerous review committees in the US government including NSF, NIH, DoE, OTA and U.S. Army.

## Course Coordinators


**Dr. Promod Kumar Patowari**
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# Surface Engineering

| **Course Name: Surface Engineering** |
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| **Registration Process** |
| **Mode of Payment of Fees:**<br>• Demand Draft should be made in favor of "Director NIT Silchar" payable at SBI NIT Silchar branch (Branch Code-7061).<br>• For Online payment: In favor of Director NIT Silchar, A/C No.010521277057, IFSC Code-SBIN0007061, MICR Code-788002004.<br>(The scanned copy of Registration form along with payment receipt should be sent over coordinator's E-mail: ppatowari@yahoo.com, bhowmiksumit04@yahoo.co.in)<br>• Registration will be accepted as first come first serve basis and limited to 50.<br>• Confirmation of participation will be intimated over Email.<br>• Due date of Registration: **7th September 2016**. |

# GIAN: Global Initiative of Academic Network

## Course Name: Surface Engineering

13th Sep – 17th Sep 2016

Place: Dept. of ME, NIT Silchar

**REGISTRATION FORM**

Full Name: _____

Designation: _____

College/Institute/Organization Affiliated: _____

Address:-_____

_____

Category: Student/Faculty/Scientist/Researcher (please Tick in the applicable field)

Department/Branch: _____

Year/Semester: _____

Email Id:_____

Mobile Number:-_____

Area of Interest: _____

Accommodation Required: Yes/No (please Tick in the applicable field)

*(The outstation participants may be provided with twin sharing accommodation on payment basis in Institute Guest House if available.)*

DD No._____ Date of Payment: _____

Or

For online payment, photocopy of bank payment receipt should be enclosed with the application.

Date: (Signature)

Place: