



Ministry of Human Resource
Development
Government of India



Global Initiative on Academic Networks (GIAN) Program

Sponsored by: MHRD, Govt. of India

Protective coatings: low friction, wear and corrosion

July 1-5, 2019

**Materials Research Centre,
Malaviya National Institute of Technology Jaipur,
Jaipur-302017, Rajasthan, India, Website: www.mnit.ac.in**

About GIAN Program

The Ministry of Human Resource Development, Government of India has launched program titled Global Initiative of Academic Networks (GIAN) in Higher Education aimed at tapping the talent pool of scientists and entrepreneurs, internationally to encourage their engagement with the institutes of Higher Education in India so as to augment the country's existing academic resources, accelerate the pace of quality reform, and elevate India's scientific and technological capacity to global excellence. GIAN program facilitates participation of high quality international academicians/researchers for delivering short-term courses and programs in Indian institutions. More details on various GIAN courses are available at <http://www.gian.iitkgp.ac.in/>

Program Overview and Objectives

The increasing demand of performance of materials for accomplishing the growing requests of higher productivity in the manufacturing industry has led to a new paradigm in the materials development, the surface modification in particular, the deposition of coatings. This solution allows to supply existing materials with new functionalities without deteriorating their original performance. This is particularly important whenever antagonist properties are requested for the materials, such as high hardness and high toughness. In many mechanical applications there are additional requirements which are most of times limiting factors for the materials use, such as the corrosive environment, the aggressive contact conditions or the working temperature. These are typically situations where the application of coatings can be the obvious solutions. This is the main topic of this course; the development and characterization of protective coatings for components used in mechanical applications. Problems related to the protection and

degradation of materials surface will be dealt with, with focus on the methods for the deposition of the coatings and the phenomena of materials disability or destruction.

This course allows the students with different backgrounds ranging from materials, mechanical, chemical and electrical engineering to update their knowledge in relation to the phenomena of materials degradation (friction, wear, oxidation and corrosion) and the solutions to fight against, particularly by the use of thin coatings. The course will have two components:

- (1) Lectures
- (2) Experiential learning (hands-on training).

The lectures will cover 4 topics:

- (i) Fundamentals of coatings deposition and their characterization,
- (ii) Fundamentals of materials degradation phenomena and their evaluation,
- (iii) Applications involving tribological performance at low temperature and
- (iv) Applications involving tribological performance at high temperature.

The experiential learning component is composed of three types of activities:

- (i) Deposition of coatings and their characterization,
- (ii) Experimental methods of surface degradation and
- (iii) Individual or group technical consultations and lab visits to further enhance the interactions during the visit.

The experimental part is based on the recent acquired knowledge of the available resources at the MNIT Jaipur for both coatings deposition and methods of materials characterization.

The objectives of this course are :

- To provide the participants with today's detailed knowledge on the main problems arising during the in-service application of materials in very harsh environments and the most updated methods for fighting them, based on the surface protection using hard, corrosion and wear resistant coatings. Starting from the coatings deposition, the recent trends in magnetron sputtering will be given.
- To give an overview of the methods for the coatings characterization, in particular from the mechanical point of view (hardness, adhesion, fracture toughness etc.) will allow to understand how these properties can correlate with the in-service performance (machining, moulding, thermal barrier diffusion etc.).
- The principal methods of materials degradation will be summarized and described with focus on corrosion, high temperature oxidation, friction and wear. Finally examples of application will be presented related with the present challenges in some industries, such as, cutting tools for hard to machine materials, moulds for glass moulding industry, self-lubricating surfaces for low friction room and high temperature applications.

The Faculty

Prof. Albano Cavaleiro

Mechanical Engineering Department,
University of Coimbra,
Coimbra, Portugal,
Pinhal de Marrocos, 3030-201 Coimbra,
Portugal.

Tel: + 351 239 790745 (Office), Fax: + 351 239 790701

E-mail: albano.cavaleiro@dem.uc.pt



Qualifications

Graduation in Mechanical Engineering (Production)

University of Coimbra, Faculty of Sciences and Technology, October 1981.

- Master Degree in Materials and Fabrication Processes

University of Porto, Faculty of Engineering, May 1986. "Use of RF sputtering for the deposition of polytetrafluoroethylene: Protection of spectrally selective surfaces"

- Ph'D in Mechanical Engineering (Materials Science)

University of Coimbra, October 1990. "Study of W-C-(Co) coatings deposited on high speed steels by sputtering"

Albano Cavaleiro is Full Professor in the University of Coimbra, Portugal. In 1990, he received a Ph.D. from Coimbra University on the field of Mechanical Engineering, with a thesis on the surface modification of materials by the sputtering deposition of thin coatings. Presently, he is head of the research group “Surface Engineering Group” of Centre for Mechanical Engineering of the University of Coimbra and head of LED & Mat at Instituto Pedro Nunes. He was invited for talks in about 40 international conferences on his field. He supervised 14 PhD students and have an extensive evaluating activity for national and international research agencies. He published more than 300 papers from which about 270 in international journals of SCI. He has more than 4000 citations and an H-index of 32 (Google Scholar).

Prof. Malay Kumar Banerjee
Former Steel Chair Professor,
Dept. of Metallurgical & Material Engineering,
Malaviya National Institute of Technology Jaipur,
JLN Marg, Jaipur – 302017, Rajasthan, India.
Tel: +91-9549654564
Email: mkbanerjee.meta@mnit.ac.in



Program Coordinators

Dr Kanupriya Sachdev
Professor
Department of Physics &
Material Research Centre,
Malaviya National Institute of Technology
Jaipur,
JLN Marg, Jaipur – 302017, Rajasthan,
India.
Tel: +91-9829128200
Email: ksachdev.phy@mnit.ac.in

Dr. M.K. Banerjee
Former Steel Chair Professor,
Department of Metallurgical and Materials
Engineering,
Malaviya National Institute of Technology
Jaipur,
JLN Marg, Jaipur – 302017, Rajasthan,
India.
Tel: +91-9549654564
Email: mkbanerjee.meta@mnit.ac.in

Program Co-Coordinators

Dr Ragini Gupta
Professor & Head
Department of Chemistry,
Malaviya National Institute of Technology
Jaipur,
JLN Marg, Jaipur – 302017, Rajasthan,
India.
Tel: 0141-2713252
Email: rgupta.chy@mnit.ac.in

Dr. Amit Singh
Assistant Professor,
Department of Mechanical Engineering,
Malaviya National Institute of Technology
Jaipur,
JLN Marg, Jaipur – 302017, Rajasthan,
India.
Tel: 0141-2713330
Email: asingh.mech@mnit.ac.in;

Who Can Attend

- Faculty members from reputed academic institutions.
- Research scholars and postgraduate students from reputed academic institutions.
- Industry experts

The course is addressed to scientists, professionals, company engineers, R&D managers and graduate students in the fields of Engineering, Chemistry, Physics, Applied and Fundamental Sciences. This course is especially of interest to those dealing with phenomena involving applications where harsh environments and extreme loading conditions occur, in order to get acquainted with the traditional background and the most recent developments of this discipline.

Program Registration Process

Step 1: One Time Registration

Registration for GIAN courses is not free because of constraint in the maximum number of participants allowed to register for a course. In order to register for any course under GIAN, candidate will have to get registered one time first to GIAN Portal of IIT Kharagpur using the following steps: 1. Create login and password at <http://www.gian.iitkgp.ac.in/GREGN/index> 2. Login and complete the Registration Form. 3. Select Courses 4. Confirm your application and payment information. 5. Pay Rs. 500/- (non-refundable) through online payment gateway. 6. Download and print “pdf file” of your enrolment application form for your personal records and copy of the same to be sent to the Course Coordinator.

Step 2: Institute Registration

1. Institute registration process is an offline process. Interested candidates are requested to download the Registration Form (docx/pdf).

2. Course Fee (Non-refundable):

The participation fee to attend the short course shall be:

Participants from abroad	:	US \$300
Industry/ Research Organizations:	:	Rs. 5000/-
Faculty members from Academic Institutions	:	Rs. 2500/-
Research Scholars/Postgraduate students	:	Rs 1000/-

The above fee includes the instructional materials, internet facility and snacks between the sessions. The accommodation will be provided on payment basis subject to availability on request otherwise participants will have to make their own stay arrangement.

3. The Registration fee has to be paid via Demand Draft/NEFT, in favour of “Registrar, MNIT Jaipur” payable at Jaipur. Payment can also be done through National Electronic Funds Transfer (NEFT) to the account of “Registrar, MNIT Jaipur” (Account No. : 676801700388 ICICI Bank, Branch MNIT Jaipur, IFSC Code: ICIC0006768).

4. Scan copy of the filled in “Registration Form” along with scan copy of “Demand Draft/ Receipt of NEFT” and Application Form generated in Step 1 must be sent via E-mail to the Course Coordinator of the programme ksachdev.phy@mnit.ac.in, on or before 1st June, 2019.

5. Selection will be made purely on First Come First Serve Basis and Eligibility (Subject to fulfilling of the seats available).

6. Maximum forty (40) participants will be accommodated in the course.

7. The Brochure and the Registration Form may be downloaded from the Institute website www.mnit.ac.in.

About the Institute

The college was established in 1963 with the name as Malaviya Regional Engineering College, Jaipur as a joint venture of the Government of India and the Government of Rajasthan, Subsequently; on June 26, 2002 the college has been given the status of National Institute of Technology and on 15 August 2007, Proclaimed Institute of National Importance through Act of Parliament. The Institute is fully funded by Ministry of Human Resource Development (MHRD), Government of India. More than 12,000 students have already been graduated since its establishment.

The Institute offers B.Tech, M.Tech, M.Sc, MBA and Ph.D programs in several disciplines of Engineering, Science & Technology, and Management.

About the Materials Research Centre

In order to augment the infrastructure for advanced research and to attain excellence in innovative research in materials technology, a centre of excellence - Materials Research Centre, has been created under the able support and guidance of the competent authority. The Materials Research Centre (MRC) aims to harness the talent resources of MNIT for promoting interdisciplinary research in appropriate materials technologies.

Besides catering to the research needs of the institutional faculty & students, the state of the art research facilities of the Materials Research Centre will also be extended to the scientists, faculty and researchers of other institutes as well as to private sector/ industries.

- MRC also contemplates instructing qualified potential users on the operation of the available instruments and the interpretation of data.
- The centre encourages inquiries concerning the development of new methodologies and welcomes contract and potential collaborative work. The equipment procured in Phase I of the Centre has been installed & commissioned.
- MRC staff and faculty is highly trained and quite thorough on application of these state of the art experimental facilities. The students of MNIT have also received trainings on the equipment & the equipment has been made open to users across the country.

Patron

Prof. Udaykumar R Yaragatti,

Director,

Malaviya National Institute of Technology,

JLN Marg, Jaipur-302017,

India

Head of the Department

Dr. Vijay Janyani

Professor & Head,

Materials Research Centre,

Malaviya National Institute of Technology,

JLN Marg, Jaipur-302017,

Phone no: 0141-2713464,

E-mail: office.mrc@mmit.ac.in

Local GIAN Co-ordinator

Dr. Vijay Janyani

Professor & Head,

Materials Research Centre

Malaviya National Institute of Technology

JLN Marg, Jaipur-302017

Phone no: 0141-2713464

E-mail: office.mrc@mmit.ac.in

Registration Form
Global Initiative on Academic Networks
(GIAN) Program
Protective coatings : low friction, wear and corrosion
July 01th – 05th, 2019
Malaviya National Institute of Technology Jaipur – 302017

Name	
Designation	
Department	
Organization	
Address for Correspondence	
Email ID	
Mobile Number	
Field of Specialization	
Accommodation Required: Yes/No	
Details of Fee Paid DD/NEFT	DD No. _____ dated _____ drawn on _____ amounting to Rs. _____/-only. Or NEFT dated _____ Transaction ID _____ amounting to Rs. _____/-only.
Signature of the Applicant with date	

Recommendations of the Sponsoring Authority

The applicant is hereby sponsored for GIAN program on “**Protective coatings: low friction, wear and corrosion**” being organized by Materials Research Centre, MNIT Jaipur, and will be permitted to attend, if selected.

Signature and Seal of the Sponsoring Authority with date	
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