

INDIAN INSTITUTE OF METALS
KANPUR CHAPTER

Annual Report (2009-2010)

by

Dr. K.Mondal
Secretary, IIM Kanpur Chapter

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Dear Members of the IIM Kanpur Chapter and Friends,

At the outset, I take this opportunity to welcome all members and particularly, new student members to the annual general body meeting of IIM Kanpur chapter. It gives me immense pleasure to present before you the Annual Report of the Kanpur Chapter of The Indian Institute of Metals.

The current council took over in May 2009 and during the last one year, we have organized several activities including a series of technical talks, 'Processing, Characterization, and Properties of Advanced Engineering Materials', the 'Metals and Materials Quiz' for local schools, 'popular lectures at local schools', "lectures by the IIT Kanpur Faculties at Institute of Engineering and Technology, CSJM University, Kanpur" for the B.Tech students and lastly. I am very pleased to mention that IIM Kanpur chapter has been trying hard in last one year in its drive to increase the membership. This has been largely possible because of the participation of the undergraduate students of Institute of Engineering and Technology, CSJM University, Kanpur.

EXECUTIVE COMMITTEE

In the last Annual General Body meeting of IIM Kanpur Chapter (held on 25th April, 2009), the following members were elected for the executive committee of the Kanpur Chapter of The Indian Institute of Metals for the year 2009-2010:

Dr. B. Basu	Chairman (& Council Member)
Dr. Pritha Choudhury	Co-chairperson
Dr. Kallol Mondal	Secretary
Dr. Krishanu Biswas	Treasurer
Dr. Kantesh Balani	Member
Dr. Gouthama	Member
(HOD, MME)	Member (Ex-Officio)

TECHNICAL TALKS

During the last financial year, the following technical talks were delivered under the joint auspices of the Kanpur Chapter of the IIM and the Department of Materials & Metallurgical Engineering, IIT Kanpur.

LIST OF SEMINARS held at IIM Kanpur chapter in 2008-09 FY

MME Departmental Talks

2009-10

1. Mar. 20th 2010

Dr. T.R. Ramachandran

Nonferrous Materials Technology Development Centre, Kanchanbagh, Hyderabad

Title: *Technological Challenges to Alumni Scrap Recycling*

2. Jan. 29th 2010

Dr. Sudip Mondal

Visiting Fellow at National Centre for Biological Sciences, Bangalore

Title: *"Microfluidics: A platform for genetic analysis to whole organism studies"*

3. Jan. 5th 2010

Dr. Praveen Kumar

Research Assistant Professor, Washington State University, Pullman, WA 99164

Title: *Multiphysics Phenomena in Multicomponent Systems: A Few Examples in Microelectronic Packaging*

4. Dec. 30th 2009

Dr. Akhlesh Lakhtakia

Title: *Ethical Reporting in Research Papers*

5. Dec. 1st 2009

Mr. Philippe Kempe

CSM Instruments, Switzerland

Title: *"Surface Testing & Nano/Ultra Nano Indentation Technique"*

6. Nov. 13th 2009

Mr. Alan Robbins

Director Market Development -Fischione Instruments Inc., USA

Title: *"Sample Preparation for Transmission Electron Microscopy"*

7. Sept. 10th 2009

Dr. A.S. Bhalla

Department of Electrical and Computer Engineering, University of Texas, San Antonio, USA

Title: *"Role of Bubbles & Clusters in Designing Electronic Materials"*

8. Aug. 19th 2009

Dr. Rajendra K. Bordia

Materials Science and Engineering, University of Washington, Seattle, WA 98195, USA

Title: *"Nanostructured Porous and Composite Ceramics from Molecular Precursors"*

9. 13th February, 2010

Dr. Amartya Mukhopadhyay

Dr. Amartya has recently finished PhD from Oxford University and will join Division of Engineering, Brown University, USA as a post-doctoral fellow starting from February, 2010.

"Understanding the influence of Carbon Nanotube Reinforcement on the Properties of Aluminoborosilicate Glass Ceramic" on 13th February at 2 pm in IET-3 seminar hall, CSJM University, Kanpur

10. February 17, 2010

Dr. Dileep Singh

Staff Scientist, Argonne National Laboratory, USA will deliver a seminar entitled *"Nanofluids for Heat Transfer Applications"*

A Report on “METALS & MATERIALS QUIZ 2009”

The **N. K. Batra Metals & Materials Quiz – 2009**, jointly organized by the Department of Materials and Metallurgical Engineering, IIT Kanpur and The Indian Institute of Metals, Kanpur Chapter was held on 23rd August, 2009 at Outreach Center, Indian Institute of Technology, Kanpur. This is the 10th time in a row that the metals and materials quiz has been organized at IIT Kanpur.

This year, altogether 15 teams from 11 different schools/inter colleges from in and around Kanpur participated in the competition. Following an initial elimination round, eight teams were short-listed for the final rounds. In the final round, the team from Kendriya Vidyalaya, IIT Kanpur, represented by Varun Harbola and Aniruddha Ghosh was declared the **winner**. The quiz was nicely conducted by Dr. Kantesh Balani, an assistant professor in the Department of Materials and Metallurgical Engineering, IIT Kanpur. The winning team was awarded cash prize and NK Batra Memorial trophy by Professor Dipak Mazumdar. The team from Kendriya Vidyalaya Armapore II comprising of Divyanshu Kumar and Deepak Sharma was the first runner up. The teams from winner and 1st runner up will now participate in the National level Prof. Brahm Prakash Memorial Quiz competition to be held at the Indira Gandhi Center for Atomic Research (IGCAR), Kalpakkam (Tamilnadu) on September 19, 2009.

This year, it was a pleasure to listen Prof. Anish Upadhyaya, a faculty member of Department of Materials and Metallurgical Engineering, IIT Kanpur and he delivered a talk entitled “**Powder Metallurgical Processing of materials for Engineering Applications**”.

A report on ‘Popular Lectures for School students’

We have continued popular lecture series in order to increase the awareness among school students about Materials & Metallurgical Engineering, one of the initiatives that were taken by the IIM Kanpur Chapter was to reach out to the schools and volunteer to deliver a series of lectures on various topics pertaining to Materials. For this, several schools were approached with the target audience being Class XI & XII Science Level students. This time we have received moderate responses. To give a flavor of different aspects of materials, for each school two lectures (~1h duration each) were planned (with two faculty members visiting each school). Our faculty colleagues delivered lectures in the following schools (list of lecture topics are noted below).

Christ Church Inter College;
Jugal Devi Inter College;
Methodist School;
Purnachandra Vidya Niketan

The lecture titles are given below.

<u>Speaker</u>	<u>Talk Title</u>
○ Dr. K. Balani-	The World of Nano-Technology and Materials
○ Dr. B. Basu-	Excitement in Research on Materials for Health Care
○ Dr. K. Biswas -	Nanomaterials: Processing, Properties and Applications
○ Dr. K. Mondal-	Why Transformation Takes Place!!
○ Dr. R. Shekhar-	Challenges in Materials Recycling
○ Dr. A. Upadhyaya-	Role of Materials in Ordnance and Aerospace Applications
○ Dr. S. Sangal -	Development of new steels for Indian Railways
○ Dr. P. Chaudhury -	Zn-based alloys



Report of WORKSHOP

ON

Processing, Characterization, and Properties of Advanced Engineering Materials

Feb. 24-28th, 2010



Organized by:

Dept. of Materials & Metallurgical Engineering
Indian Institute of Technology, Kanpur



*IIT Kanpur Golden
Celebration*

Jubilee

Venue : PBCEC Conference Room, IIT Kanpur

Emergence of advanced materials for myriad applications such as aerospace, automotive, biomedical, defense, etc require critical understanding of material phenomenon starting from the choice of material, to its controlled processing, in being able to manipulate its resulting properties and characteristics. Hence, *Processing, Characterization, and Properties of Advanced Engineering Materials* workshop **was designed to familiarize users with fundamental principles and applied aspects of materials engineering.** Workshop lectures were delivered by renowned Professors from IIT Kanpur and speakers from abroad elucidating fundamentals to recent trends in the industry and academia. The workshop lectures were focused on (i) Fundamentals of materials science and engineering, (ii) Choice of materials for engineering application, (iii) Optimal processing route for synthesizing material, (iv) phase and microstructural characterization, (v) evaluating mechanical (wear, fatigue, erosion, impact), chemical (corrosion, oxidation, etc), and

thermal (high temperature attack) properties. Attendees were also provided *laboratory tours* with real-life problems and were introduced with specific *case-studies* to render problem-handling capabilities.

Supported by:

Indian Institute of Metals Kanpur Chapter & Material Advantage at IIT Kanpur



"Tell me and I forget. Show me and I remember. Involve me and I understand."

~ Chinese proverb

A report on “lectures by the IIT Kanpur Faculties at Institute of Engineering and Technology, CSJM University, Kanpur”

This time we have taken new initiative where faculty members from the Materials and Metallurgical Engineering, IIT Kanpur, have delivered lectures on some subjects which are chosen by the students of UIET, CSJM Kanpur. This is definitely going to be an excellent program under IIM Kanpur Chapter because this is a very good interface between the IIM and students of materials and metallurgical engineering. We are sure that there will be a great interests being developed in the bachelor students of materials engineering towards IIM by seeing the kind of overwhelming response from the students of UIET, CSJM Kanpur. Even we have thought of taking it one step forward by making a trip of the students to different laboratories of the department of Materials and Metallurgical Engineering, IIT Kanpur. Below are the three topics on which Prof. B.Basu and Prof. k.Balani have delivered lectures.

Dr. B. Basu:

1. Fundamentals of X-ray Diffraction and crystal structure analysis

This lecture was on the basic fundamentals on the generation of X-ray and its application in materials characterization like determination of crystal structures, lattice strain, crystal size, phase diagram etc.

Dr. K.Balani:

2. Electron and Neutron Diffraction

This lecture incepted the basics of electron and neutron interaction with matter and developed how diffraction occurs via electrons and neutrons. Starting from Bragg's equation, the selection rules of the electron diffraction were described and evaluation of zone axis was also discussed. This interactive session with students assisted in terms of appreciating the differences between diffraction occurring via x-rays and electrons.

3. SEM with EDS and WDS

Herein the interaction volume of electron with matter was discussed to evince signals that arise and are utilized for imaging and quantification. Consequently, the concepts of spectroscopy both via energy-dispersive and wavelength-dispersive were built. The effect of incident beam energy and atomic number was elucidated. The quantification via comparison with a standard was also described. The requirement of the ZAF (Atomic number, Absorption, and Fluorescence) was detailed to get a correct quantification.

A report on “new website for IIM Local Chapter <http://www.iitk.ac.in/infocell/IIM/>”

This is one more initiative that has been taken up this year. We thought that it would always be good if we have website for our local chapter and this can be looked by a greater number of people. This would give important information of the chapter and past and future activities. It is just in its nascent state. Once all the information is uploaded, it will be sent to IIM Head quarter requesting to provide a link in its main site.

CHAPTER NEWS

Awards won by chapter members:

1. Dr. Kantesh Balani, Department of Materials and Metallurgical Engineering, has been selected for the Young Scientists Award
2. Dr. Kantesh Balani received Dr. R.L. Thakur Memorial Award-2009 from the Indian Ceramic Society.
3. Dr. Dipak Mazumdar, Department of Materials and Metallurgical Engineering, has been selected to receive the GD BIRLA Gold Medal-2009
4. Dr. Anish Upadhyaya, Department of Materials and Metallurgical Engineering, has been selected for the 2009 Metallurgist of the Year Award
5. Dr. R Balasubramaniam, Department of Materials and Metallurgical Engineering, has been selected to receive the inaugural IIM Distinguished Educator Award 2009
6. Dr. B. Basu and Dr. A. Upadhyay are the recipient of Dr. P.K.Kelkar Fellowship by IIT Kanpur.
7. Two new life members (Dr. V. Verma and Dr. A. Subramaniam of Department of Materials and Metallurgical Engineering, IIT Kanpur)

Obituary on Prof. R. Balasubhramaniam



Professor Ramamurthy Balasubramaniam
Department of Materials and Metallurgical Engineering,
Indian Institute of Technology, Kanpur

Website: <http://home.iitk.ac.in/~bala/>

Professor Ramamurthy Balasubramaniam (fondly known as 'Bala') was born on 15 April 1961 in Salem, TamilNadu. He obtained his Bachelor of Technology (Gold medalist) in Metallurgical Engineering from Institute of Technology, Banaras Hindu University (BHU), Varanasi. For all round performance as an undergraduate student, he was awarded Gandhi Gold medal from Department of Metallurgical Engineering, BHU as well as Vishwa Bharathi Award from the Indian Institute of Metals, both in 1984. He then proceeded to Rensselaer Polytechnic Institute Troy (RPI), USA and obtained his Doctor of Philosophy in Materials Engineering in 1990. After spending a brief stint as an Adjunct faculty at RPI, he joined the faculty of Materials and Metallurgical Engineering at IIT Kanpur on 2nd April 1990 and became Professor on 13th December 2001.

Professor Balasubramaniam's research interests included Material-Hydrogen Systems, Environmental Degradation of Materials, Structure-Property Correlation in Advanced Materials and Indian Archaeometallurgy. Professor Balasubramaniam was a prolific researcher and has published more than 250 research papers in refereed journals of repute. He has published 10 books. Two of his recent books, which dealt Indian Archaeometallurgy are on "The Saga of Indian Cannons" and "Story of Delhi Iron Pillar". His research on the corrosion resistance of

Delhi's iron pillar attracted worldwide attention. He also adopted the text book of Materials Science, written by Callister. One of his most recent research project was his work on Corrosion Prevention of Rails under the Technology Mission on Railway Safety.

In recognition to his outstanding contribution as an active researcher in the field of Metallurgy, Materials Science and Archeometallurgy, Dr. Balasubramaniam received a number of prestigious awards, including Young scientist award (1993), Indian National Science Academy, Alexander von Humboldt Foundation Research Fellowship (1996), Materials Research Society of India (MRSI) Medal (1999), Metallurgist of the Year award (1999), Ministry of Steels and Mines, Government of India. He was a member of the National Commission for History of Science. He was an editorial member of a number of international journals in the area of corrosion and Archeometallurgy. He was one of the finest teachers and recently received the inaugural Distinguished Educator Award (2009) from Indian Institute of Metals (IIM). Prof. Balasubramaniam was bestowed with B B Lal Chair Professor at IIT Kanpur in September 2009. Dr. Balasubramaniam was a life member of Indian Institute of Metals.

Apart from Academics, Dr. Balasubramaniam was an enthusiastic sportsperson with a passion for cricket. He also had a great passion, both for Indian and Western music, right from his student days in BHU. Professor Balasubramaniam's illustrious career was cut short by his untimely demise on December 9, 2009 at 2:20 am. He is survived by his wife Dr. Gaitri Saini Balasubramaniam and two daughters, Gowri and Gargi. The entire community of IIT Kanpur, his friends and professional colleagues wish that his departed soul may rest in peace.

In this hour of grief, we join the family members of **Professor R Balasubramaniam** in praying that his soul may rest in peace.

NEW COUNCIL OF THE IIM KANPUR CHAPTER

The IIM members of the Kanpur Chapter will be electing a new council of the executive for the year 2010-2011 during this general body meeting. It was decided in the previous executive committee meeting that for effective performance, the tenure of the council should be of one year. Nevertheless, the head-office insisted that we have the election year.

I have been the Secretary of the chapter for 2009-10. I am confident that under the leadership of the new council members, IIM Kanpur Chapter will attain new heights. To this end, I recommend that we should strongly involve the participation of both the undergraduate and postgraduate students of Department of Materials and Metallurgical Engineering, IIT-Kanpur as well as students of Materials Science Department, IET, Kanpur University. We also have to evolve some planning of how to increase interests towards chapter activity among scientists of DMSRDE as well as engineers/technical personnel from industries around Kanpur, Lucknow and neighboring areas. To this end, the interaction with DMSRDE scientists would be critical. In addition, we may need to plan for small workshops, which may be highly relevant towards the industry. Also, we need to organize more programmes involving the participation of the student community. In the past, attempts were made to demonstrate the school students some interesting experiments, related to basic principles/applications of materials. I hope that such exercise will be performed more frequently in the coming year. In the above context, the IIM local chapter requires your suggestions and active interest.

During the closer interaction with several schools in last one year, an idea of organizing ‘open house’ for school students has been conceived. The idea is that school students of class XI and XII will visit various laboratory facilities of IIT Kanpur. It is hoped that new council members of IIM Kanpur chapter will arrange ‘open house’ during 2010-2011.

At last, I must mention that I have been immensely helped by the executive committee members, departmental colleagues and students in organizing as well as participating in the various activities of the local chapter throughout the past year. I wish to take this opportunity to place on record my sincere thanks to all of them.

Thank you all for your participation in IIM activity and I do hope that our activities will grow in the days to come!

K.Mondal
Secretary, IIM Kanpur Chapter
1st May, 2010