

# INDIAN INSTITUTE OF METALS KANPUR CHAPTER

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## Annual Report (2008-2009)

by

**Dr. Bikramjit Basu**  
Secretary, IIM Kanpur Chapter

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 2008 and during the last one year, we have organized several activities including a series of technical talks, 'Refresher course for the Industry professionals', the 'Metals and Materials Quiz' for local schools as well as 'popular lectures at local schools'. I am very pleased to mention that IIM Kanpur chapter has been very successful in last one year in its drive to increase the membership and more than 40 new student members have now joined. This has been largely possible because of the participation of the undergraduate students of Institute of Engineering and Technology, CSJM University, Kanpur. It is now possible to start a 'student affiliate chapter' for IIM Kanpur chapter. On behalf of the local chapter, I appreciate your efforts towards aiming this goal. The increased membership does have a positive impact on the financial aspect as far as the chapter grant from IIM Headquarters is concerned.

### EXECUTIVE COMMITTEE

In the last Annual General Body meeting of IIM Kanpur Chapter (held on 26<sup>th</sup> April, 2008), the following members were elected for the executive committee of the Kanpur Chapter of The Indian Institute of Metals for the year 2008-2009:

Prof. A. Upadhyaya	Chairman (& Council Member)
Dr. B. Basu	Secretary
Dr. Pritha Choudhury	Treasurer
Dr. Krishanu Biswas	Member
Dr. Kantesh Balani	Member
Dr. Kallol Mondal	Member
Mr. S. K. Yadaw	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

Sr.No.	Date	Venue	Speaker & Affiliation	Topic
1	26.4.2008	FB-421, IIT- Kanpur	Dr. K. U. Bhasker Rao Director, DMSRDE, Kanpur	Metallic Materials: a DRDO Perspective
2	16.7.2008	FB-421, IIT- Kanpur	Prof. Akhlesh Lakhtakia Charles G. Binder Endowed Professor of Engineering, Science & Mechanics Pennsylvania State University, USA	Emerging Directions in Sculptured-Thin-Film Research
3	01.09.2008	FB-421, IIT- Kanpur	Dr. R.K. Dayal Head, Corrosion Science & Technology Division IGCAR, Kalpakkam	Indian Materials Database for Scientists, Engineers and Industries
4	02.02.2009	L-15, IIT- Kanpur	Mr. L. Pugazhenthay President, IIM; Executive Director, Indian Lead Zinc Development Association	Indian Non Ferrous Metals Industry-Current Scenario & Emerging Perspectives
5	04.02.2009	L-15, IIT- Kanpur	Mr. M. Narayana Rao Chairman & Managing Director, Mishra Dhatu Nigam Limited, Hyderabad	Emerging Challenges for Metal Processing in Critical Sectors
6	23.02.2009	L-15, IIT- Kanpur	Dr. Dinesh Agrawal Professor of Materials and Director of Microwave Processing and Engineering Center, Pennsylvania State University, USA	Challenges in Microwave Sintering of Materials
7	25.02.2009	L-5, UIET CSJM University Kanpur	Dr. Paul Craddock British Museum, London	Scientific Authentication & Examination of Looted Antiquities
8	04.03.2009	FB-421, IIT- Kanpur	Dr. Jiann Yang (Jim) Hwang Michigan Technological University, USA	Microwave Steel Making – The Future Steelmaking Technology?

## **METALS & MATERIALS QUIZ 2008**

The **N. K. Batra Metals & Materials Quiz – 2008**, jointly organized by the Department of Materials and Metallurgical Engineering, IIT Kanpur and the Indian Institute of Metals, Kanpur Chapter was held on 24<sup>th</sup> August, 2008 at Outreach Center, Indian Institute of Technology, Kanpur. This is the ninth time in a row that the metals and materials quiz has been organized at IIT Kanpur.

While welcoming the participants, Dr. Bikramjit Basu, Secretary, IIM-Kanpur chapter briefed some important information about the Quiz and the activities of IIM Kanpur chapter, in general. Prof. Anish Upadhyaya, chairman, IIM-Kanpur chapter delivered an encouraging speech for the students. On behalf of the department, Professor Dipak Mazumdar, acting Head of the Department of Materials and Metallurgical Engineering welcomed the student participants. This year, altogether 19 teams from 15 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 Sir Padampat Singhania Education Center, represented by Abhishek Gupta and Rajesh Tripathi was declared the winner. The winning team was awarded cash prize and NK Batra Memorial trophy by Professor Dipak Mazumdar. The team from Methodist High School comprising of Vishal P. Gupta and Subham Srivastava was first runner up. All the student participants were given the participation certificate by Dr. Pritha Choudhury, Head, Department of Materials Science, CSJM University, Kanpur. The team from Sir Padampat Singhania Education Center 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 20, 2008. This is the fifth time in a row that Sir Padampat Singhania Education Center is winning the N K Batra quiz.

It has been a practice to invite some eminent academician/researcher from R & D Labs/ persons from industries to deliver a talk during the quiz competition. This year, it was a pleasure to listen Prof. Sandeep Sangal, a faculty member of Department of Materials and Metallurgical Engineering, IIT Kanpur and he delivered a talk entitled “**Recent Excitement in Designing New Steels for Indian Railways**”. Prof. Anish Upadhyay was the co-ordinator of the Prize Distribution ceremony. Professor R. C. Sharma, a faculty member of Department of Materials and Metallurgical Engineering gave away all the certificates to the student volunteers. Finally, Dr. Kallol Mondal, Executive Committee member of IIM-Kanpur Chapter proposed the vote of thanks to his colleagues and student volunteers for the successful organization of the quiz.

### **A report on ‘Popular Lectures for School students’**

In order to increase the awareness among school students about Materials & Metallurgical Engineering, one of the initiatives that was 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. We received an overwhelming response to our initiative (**Photograph A-D**). In the First Phase, we visited seven schools. 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

Christ Church Inter College;  
Jugal Devi Inter College;  
Methodist School;  
UP Kirana School;

Delhi Public School (DPS), Kalyanpur;  
Kendriya Vidyalaya, Armapur;  
Purnachandra Vidya Niketan  
Saraswati Gyan Mandir Inter College;

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



(A)



(B)



(C)



(D)

Photos: Dr. B. Basu delivering lecture on bio-materials (A) to students of Saraswati Vidya Mandir (B). Dr. Kallol Mondal responding to the queries of students (C). Dr. A. Upadhyaya and Dr. K. Balani with the principal of Christ-Church Inter School.

A report on Refresher Course on '*Role of Materials & Manufacturing in Industry*':

Recently, the IIM Kanpur Chapter supported in conjunction with the Department of Materials & Metallurgical Engineering organized a **Refresher Course on *Role of Materials & Manufacturing in Industry*** (17-18 October, 2008). This refresher course was structured for shop-floor professionals and to educate them on the fundamental concepts pertaining to Materials and Manufacturing through lectures, case studies and hands-on

laboratory experiments. We had participants from Ordnance factory (Field Gun Factory, Kanpur) and ACMS in the first edition (**Photograph X**). In brief, the course covered the topics:

**18.10.08 (Saturday)**

**Session I:** Microstructure-Property Correlation in Materials + Lab  
(Speaker: Dr. K. Biswas)

**Session II:** Phase Transformation and Heat-Treatment + Lab  
(Speaker: Dr. K. Mondal)

**19.10.08 (Sunday)**

**Session III:** Manufacturing Challenges in Small Arms Manufacturing & PIM  
(Speaker: Dr. A. Upadhyaya)

**Session IV:** Fundamentals of Mechanical Properties; Ceramic Processing Lab Exercise  
(Speaker: Dr. B. Basu)



**Picture X:** Group photograph with the participants of the refresher course on *Role of Materials & Manufacturing in Industry* organized by IIM Kanpur Chapter.

**A Report on Visit of the President IIM to Kanpur Chapter**

Mr. L. Pugazhenty (President, IIM) visited the IIM Kanpur Chapter on February 2, 2009. This is possibly the first time that IIM president visits IIM Kanpur chapter, besides the event when our chapter organized NMD celebration. During his visit, he interacted with faculty members, students, chapter office bearers and members (**Photo A**). Under the auspices of the Department of Materials and Metallurgical Engineering and the IIM Kanpur Chapter Mr. Pugh delivered following two lectures (**Photo B,C**):

- (i) Global Melt-Down: Adversity to Opportunity
- (ii) Indian Non-Ferrous Industry- Current Scenario & Emerging Prospects

Mr. Pugh in his talk provided a comprehensive review of the status of the non-ferrous metal industry starting from pre-historic time to the present. He also reviewed the effect of economic reforms and the current global melt-down on the growth prospects of the non-ferrous sector. He described the post-independent scenario in India, wherein domestic production and usage of non-ferrous metals was very limited and the country was primarily import-dependent. This restricted the utilization of non-ferrous metals in various applications. In the post-independence period, in the 60's, the government set up plants for production of aluminium, copper, zinc and lead in order to meet the increasing domestic demand and to bring down the imports of these metals. However, these units were subjected to excessive control and regulations, with the result that they were not

allowed to import newer technologies, expand production capacities, and step up exploration and mining activities. Because of such industrial and trade regulations, the requirement of non-ferrous metals from the manufacturing sector, automobiles, infrastructure etc, witnessed only marginal growths. Mr. Pughazhenty highlighted that the introduction of macro-economic reforms in 1991 led to privatization of most government-owned primary producers of aluminium, zinc and lead, which, in turn, led to rapid capacity expansions, setting up captive power plants, overseas mines acquisition. Due to liberalization, the domestic and export demands of non-ferrous metals have grown manifold, due to the increased production of automobiles, appliances as well as thrust on infrastructure like power, highways, construction, telecom etc. However, despite such growth, India still lags far behind China and UK in the per-capita consumption of metals such as aluminium, copper and zinc (**Slide 1**). In the context of the present global recession, Mr. Pugh highlighted the fall in the price of non-ferrous metals, such as copper, aluminium, zinc and lead (**Slide 2**) which has resulted in a build-up of the inventory of such metals (**Slide 3**). However, based on his analysis of the exports from the emerging economies (**Slide 4a**), he expressed his confidence that world economy in the coming years will be driven by the sustained momentum of the developing economies (**Slide 4b**). The trend in the non-ferrous metal industry in India corroborates this. Currently, the Indian producers in aluminium, copper and zinc are aspiring to reach the levels of global scale of economy of the order of 1.0 million tonnes and they are also gradually moving up in the world rankings. Mr. Pughazhenty in his address expressed the hope that the Indian non-ferrous metals producers can attain greater heights in the coming years if conducive, investor-friendly policies in mining and exploration prevails and with further encouragement of the foreign direct investment. He also suggested that Indian metals industry should to spend more on R & D so that newer, eco-friendly and cost effective technologies in mining, exploration and processing can evolve.

Mr. Pughazhenty's lecture was followed by an interactive session with the second batch of the students enrolled in the Post-Graduate Programme for Executives on Visionary Leadership in Manufacturing (PGPEX-VLM) (**Photo D**). This program has recently been started by IIT Kanpur in conjunction with Indian Institute of Management (IIM), Calcutta and IIT Madras. Mr. Pugh observed that a similar program aimed at middle- to top-level executives in industries should be formulated by IIM as well.



(A)



(B)



(C)



(D)

**Photos (A):** Mr. Pugazhenthly with faculty members of the Department of Materials & Metallurgical Engineering at Kanpur (From L to R) Dr. P. Craddock, Dr. R.K. Dube, Dr. S. Sangal, Dr. R. Mitra (IIT Kgp), Dr. K. Balani, Dr. D. Mazumdar, Dr. S.C. Korla, Dr. A. Upadhyaya, Dr. Gouthama and Dr. K. Biswas. **(B):** Mr. Pugazhenthly delivering lecture on Global Meltdown-Adversity to Opportunity. **(C):** President IIM delivering lecture on Indian Non-Ferrous Metal Industry to the participants of the Post-Graduate Program for Executives for Visional Leaders in Manufacturing (PGPEX-VLM). **(D):** Group photograph of the President, IIM with IIM Kanpur Chapter members and VLM students.

### **A Report on Visit of the Mr. M. Narayana Rao to IIM Kanpur Chapter**

Mr. M. Narayana Rao, CMD of MIDHANI and Vice-President Non-Ferrous Section of the Indian Institute of Metals visited I.I.T. Kanpur on February 4, 2008. He interacted with faculty member of the Department of Materials and Metallurgical Engineering (MME), students and the members of the IIM local chapter. Later, he delivered a lecture on *Emerging Challenges for Metal Processing in Critical Sectors* (**Photos A,B,C**). In his lecture, Mr. Rao highlighted the challenges faced by metal processing industries on price and quality fronts. To address the same, he stressed that a fundamental understanding of existing processes is required together with the knowledge-base to develop new method through effective management-technology interfacing. Such issues become more pertinent for materials for strategic applications which necessitate stringent quality specifications. Mr. Rao highlighted the challenges in processing a range of metals and alloys manufactured for critical applications in space and aerospace, ordnance, nuclear and thermal power sectors at Mishra Dhatu Nigam Limited (MIDHANI). Through specific case studies, he demonstrated that value-added products that are manufactured through intelligent processing not only meet the customer's specification but many a times they even exceed those. Mr. Rao stressed that in order to economically produce materials with improved quality, consistent properties and enhanced functionality, industries should adopt mathematical modeling and make

judicious use of sensors as integral components. Following his talk, Mr. Narayana Rao had extensive interaction with the under-graduate and post-graduate student of MME Department as well as the second batch of the students of the Visionary Leaders in Manufacturing Programme (VLMP) (**Photo D**).



(A)



(B)



(C)



(D)

(A,B): Mr. M. Narayana Rao delivering lecture at IIT Kanpur on *Emerging Challenges for Metal Processing in Critical Sectors*. (C): Prof. Rajiv Shekhar felicitating Mr. M. Narayana Rao. (D): Group photograph of the IIM Kanpur Chapter members and students with Mr. M. Narayana Rao.

## CHAPTER NEWS

It is heartening to note that at least 40 BTech students of IET, CSJM University and at least 10 students of IIT Kanpur have become student members of IIM Kanpur chapter. This is probably for the first time that we have increased membership outside IIT Kanpur to such a significant extent. Prof. Bikramjit Basu received the prestigious **Coble Award** for Young Scholars of the American Ceramic Society in person at the Annual meeting of the American Ceramic Society on October 6, 2008 in Pittsburgh, USA. Bikramjit Basu has also been invited to be Member of the Editorial Board for "Journal of Materials Engineering Innovation-IJMatEI" (<http://www.inderscience.com/ijmatei>), published by Inderscience Publishers, UK as well as the Member of the Editorial Board of the Elsevier journal, Materials Science and Engineering: C (Materials for Biological Applications), which has an ISI impact factor of 1.6 in 2005.



On a sad note, I wish to inform you that the members of Indian Institute of Metals, Kanpur Chapter are shocked at the sudden and sad demise of Professor Sanjeev Bhargava. Prof. Bhargava was a life Professor Bhargava was the Life Member of the Indian Institute of Metals (IIM). He actively contributed to the IIM Kanpur Chapter activities and had also served as its Secretary.



An alumnus of IIT Kanpur, Prof. Bhargava obtained his B.Tech, M.Tech and Ph.D, all in Metallurgical Engineering in the year of 1975, 1977 and 1984, respectively. After working at Mishra Dhatu Ispat Nigam Ltd. (MIDHANI), Hyderabad, he joined IIT Kanpur as Assistant Professor in 1989. He rose to the position of Professor in November 1995. On deputation from IIT Kanpur, he was lately working as the founding Director of PDPM Indian Institute of Information Technology, Design and Management (IIITDM) Jabalpur. He, through his dedication and hard work, was striving to bring IIITDM to International standards through Indo-Japanese collaboration.

Professor Bhargava's major research interests were in the area of advanced manufacturing processes, powder metallurgy, titanium-based superalloys/intermetallics for high temperature applications etc. Professor Bhargava was a prolific researcher and published more than 50 research papers in international journals of repute. He also supervised a number of PhD students and many of his former students are currently engaged in teaching and research at various academic institutes and research laboratories across the country, including Indian Institute of Science, National Aerospace Laboratory, Defense Metallurgical Research Laboratory etc. Prof. Bhargava was a member of the national committee for the indigenous development of gas turbine materials during the period of 1987–1988. He received Samsonov award for the best research paper published in four years in the international journal "Science of Sintering" in 1992 and the special award from M/s Midhani Ltd. for indigenously developing two Titanium alloys for high pressure applications.

Prof. Bhargava was in New Delhi to attend an official meeting and had a massive heart attack. The unfortunate end came in the afternoon of 23<sup>rd</sup> January, 2009. He is survived by wife, Mrs. Sarita Bhargava, son Suvarat, and daughter Akansha. We pray to God to give his family strength and courage to bear this irreparable loss. May the departed soul 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 2009-2010 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 the last three years. 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 2009-2010.

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!

Bikramjit Basu  
Secretary, IIM Kanpur Chapter  
25<sup>th</sup> April, 2009