Guest Editor
Sandeep Verma

Assisted by
Srirupa Chatterjee

Advisory Board
S. K. Aggarwal
B. Deo
S. G. Dhande
A. K. Mallik
K. Muralidhar
R. K. Thareja
The Indian Institute of Technology Kanpur has been dedicated to the service of the nation since 1959. The Institute was nurtured in its formative years by its first Director, Prof. P.K. Kelkar, a great visionary leader. Prof. Kelkar championed the cause of international collaboration since the inception of the Institute in the form of technical assistance under the Kanpur Indo-American Program (KIAP). KIAP was primarily a consortium of nine leading institutions of USA whose faculty members assisted in the setting up of academic programs and development of laboratories for instruction as well as research. Over the years, there has been a consistent rise in international cooperation, given the high visibility and international standing of IIT Kanpur in academics and research. This trend is reflected in the quantum of funding that has been attracted and the nature of competitive international projects taken up by the faculty members of IIT Kanpur. Such cooperation not only complements the institute’s research excellence, but also brings in deeper understanding to state-of-the-art research problems.

The need for international collaboration in niche areas of technology, science and humanities is also driven by the current world order wherein it is imperative to seek massive investments in knowledge-intensive developing economies. Accordingly, transnational research networks are also nurtured by major funding agencies such as Department of Science and Technology (DST), Department of Biotechnology (DBT) and Council for Scientific and Industrial Research (CSIR) through their country-specific themed research programs. Another aspect of international cooperation deals with student exchange through well formulated programs which allow IIT Kanpur students to spend limited time in international universities and institutes, while welcoming international students to spend a semester or more at IIT Kanpur.

It is my pleasure to present this issue of Directions on International Collaboration in the Golden Jubilee year of IIT Kanpur. I do so with a fervent hope that this endeavor will spark more fruitful collaborative efforts for the advancement of fundamental research and for creating a cutting edge academic environment.

Sandeep Verma  
Department of Chemistry, IIT Kanpur  
Guest Editor, Directions
4 Preface

106 International Workshop

108 International Projects

8 1. Awareness in Manufacturing Environment Using RFID and Sensor Technology
   A. R. Harish, Sandeep Kumar Yadav and P. K. Kalra

18 2. Transport and Traffic: From Molecules to Vehicles
   Debashish Chowdhury

26 3. Addressing Climate Change via Efficiency Improvement in the Indian Power Sector
   Anoop Singh

   Rajeev Sinha

42 5. Modeling the Formation of an Aneurysm in an Arterial Bifurcation
   K. Muralidhar

48 6. Electromagnetic Analysis of Electrical Machines with Integrated Drive Systems
   Manuli Gupta

54 7. Modeling Implications of Protein Aggregation in Neurodegeneration
   Sandeep Verma

60 8. Modelling the Supply Chain of Special Economic Zones in India
   Rasyush Mehta, Ashok Mittal and Kripa Shanker

66 9. Fighting Global Warming
   Sanjay Mittal

72 10. The Isomorphism Conjecture
   Manindra Agrawal

78 11. Low Cost and Flexible Organic Solar Cells
    3. Sundar Kumar Iyer and Satyendra Kumar

88 12. Centre of Engineering Excellence
   Deepak Gupta, Ajit Kumar Chaturvedi, A. K. Mittal and Sanjay Mittal

92 13. Collaboration between Intel and IIT Kanpur
   Sanjeev K Aggarwal, Malak Chaouduri, Shashack K Mehta and Rajee Moona

98 14. Collaborations between IIT Kanpur and University of Applied Sciences, Darmstadt
   F. Murail Prasad