CURRICULUM VITAE

1. Name, designation and address for communication:

Professor INDRANIL MANNA, ***JC Bose Fellow***
FNA, FNAE, FNASc, FASc, FTWAS, MAPAM, FIE(I), FIIM, FEMSI, PRS, PhD
Professor, Metallurgical & Materials Engineering Department
Indian Institute of Technology (IIT) Kharagpur
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Email: imanna@metal,iitkgp.ernet.in; imanna@iitk.ac.in; and im_kgp@yahoo.co.in
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2. Residential address:

Flat A-78, IIT KHARAGPUR, W.;B.;721302, INDIA
Permanent: B-10/250, KALYANI, NADIA, WB 741 235, INDIA

3. Date and Place of Birth: **January 22, 1961; CALCUTTA (KOLKATA)**

4. Religion: **Hinduism**

5. Nationality: **Indian (Passport No.: Z 2859964)**
Born in Calcutta, India

6. Family Status: **Married with two children**
(Wife: Snigdha MANNA)

7. Educational Qualifications:

DEGREE/EXAMINATION (TENURE)	INSTITUTION	MAJOR	PERFORMANCE
Premchand Roychand Scholarship (**PRS**) (1993-1998)	**CALCUTTA UNIV.** Calcutta - 700 071 *India*	Applied Physics (Metallurgy)	Thesis accepted & **Mouat medal** awarded (1999)
Doctor of Philosophy (**Ph.D.**) (1986-1990)	**I.I.T., KHARAGPUR** W.B.-721302 *India*	Engineering	No grade is awarded
Master of Technology (**M.Tech.**) (1983-1984)	**I.I.T., KANPUR** U.P.- 208016 *India*	Physical Metallurgy	**Topper** Cumulative Perform. Index = 9.6/10.0

Bachelor of Engineering (**B.E.**) (1979-1983)	**B. E. College** (Calcutta University) *India*	Metallurgy	Rank - **2nd** Class - I 79% in aggregate
Higher Secondary (Class-XII) (1977-1979)	**Pannalal Institution** Kalyani, W.B. (under W.B.C.H.S.E.)	Science	**1st Div**. 69% in aggregate
Secondary Examination (Class - X) (1971-1977)	**Pannalal Institution** Kalyani, W.B. (under W.B.B.S.E.)	General	**1st Division Rank - 43rd Star Marks** 77% in aggregate

8. Professional (Administrative/Research/Teaching) Experience:

A. Director, IIT Kanpur (7 Nov 2012 to 6 Nov 2017; 5 years)

Administrative responsibilities within IIT Kanpur (ex officio):

a) Member, IIT Council, Ministry of Human Resource Development, Govt of India
b) Member, Board of Governors, IIT Kanpur
c) Member, Finance Committee
d) Chairman, Building & Works Committee
e) Chairman, Academic Senate
f) Chairman, Institute Advisory, Committee and Heads' Group
g) Chairman, Anti Ragging Committee (statutory)

Academic duty/responsibility:

a) Professor, Materials Science and Engineering Department (2012-17)

Administrative responsibilities outside IIT Kanpur (ex officio):

a) **National Coordinator**, IMPRINT India (an MHRD initiative)
b) **Chairman, Namame Gange Project** (Clean Ganga Mission)
c) **Member**, Central Advisory Board of Education (CABE), MHRD (HE) (2014 – 17)
d) **Chairman**, Research Council, CSIR-AMPRI, Bhopal (2013-16)
e) **Member**, Governing Body, Indo-US Science & Technology Forum (2012-17)
f) **Member**, Executive Council, AICTE, New Delhi
g) **Member**, Samavesh, Niti Aayog (S&T group) (2016 – present)
h) **Member**, National Innovation Council, UP Section (2012-17)
i) **Member**, IIM Board of Governors, Lucknow (2012-17)
j) **Member**, IIM Society, Indore (2012-17)
k) **Member**, Board of Governors, IIEST Shibpur (2014 – present)
l) **Member**, Board of Governors, IISER, Kolkata (2012-17)
m) **Member**, Board of Governors, IISER, Pune and IISER, Tirupati (2012-17)
n) **Member**, Board of Governorrs, MNNIT, Allahabad, U.P. (2012-17)

Responsibilities as Peer or Domain Expert outside IIT Kanpur

a) President, Indian Institute of Metals (2016-17)

b) Vice President, Indian Institute of Metals (2013-16)
c) Vice President, Indian Naional Academy of Engineering (INAE) (Fellowship, Awards & Corporate Communication) (2014 – present)
d) Member of the Research Councils of GAIL India (2013 – present)
e) Member, CSIR-National Physical Laboratory in New Delhi (2010 – 2016)
f) Member, Administrative Council, Abdul Kalam Tech. University, U.P. (2012-17)
g) Member, Research Council, BHEL (2014 – present)
h) Member, TEQIP Board, West Bengal S&T Council for Jadavpur Univ (2014-17)
i) Member, Board of Steel Research and Technology Mission Initiative (SRTMI), and Biju Patnail National Steel Institute, Ministry of Steel, Government of India (2014 – present)

B. Director, CSIR-CGCRI (1 Mar 2010 to 31 Oct 2012)

Central Glass and Ceramic Research Institute (CGCRI), Jadavpur, Kolkata. A CSIR Laboratory (under the Ministry of Science and Technology, Government of India) – between March 1, 2010 and October 31, 2012.

Administrative responsibilities within CSIR:

a) **Member, Governing Body and Society of CSIR** (highest body of CSIR)
b) **Member, Planning Commission Working Group of CSIR** for 12th 5-year plan
c) **Member, Planning Commission Working Group of DAE** (as DG-CSIR's representative) for 12th five year plan
d) **Member, Planning Commission Working Group of DST** for 12th 5-year plan
e) **Member, Senate, Academy of Scientific & Industrial Research (AcSIR)**
d) **Member, Management side, Joint Consultative Mechanism, CSIR**
e) **Member, Monitoring Committee**, NMITLI project on SOFC at CSIR-CGCRI
f) **Chairman, Steering Committee,** NMITLI Project on SOFC at CSIR-CGCRI
g) **Task Force Chairman**, CSIR Network Projects NWP 027, 028, 029, 035, 051
h) **Task Force Chairman**, CSIR Supra institutional Project SIP 023
i) **Member, Research Council** of CSIR-NML, CSIR-NPL, CSIR-CMERI, CSIR-AMPRI
j) **Member, Management Council** of CSIR-NML and CSIR-IICB
k) **Member, Advisory Committee**, CSIR Innovation Complexes at Chennai, Mumbai, and Kolkata (Baruipur and Salt Lake)
l) **Chairman**, CSIR Committee on Human Resource Development, Engineering Sciences (ENG-41)
m) **Chairman**, Bureau of Indian Standards, Ministry of Consumer Affairs, Standards Committee on Ceramics (CHD 09) [as Director, CSIR-CGCRI]
n) **Chairman**, Bureau of Indian Standards, Ministry of Consumer Affairs, Standards Committee on Glass and Glassware (CHD 10) [as Director, CSIR-CGCRI]

C. At IIT-Kharagpur (1985 - present):

a) **INAE Visvesvarya Chair Professor**, Department of Metallurgical & Materials Engineering, I.I.T., Kharagpur and CSIR-CGCRI Kolkata – April 2009 to March 2011.
Usual teaching and research assignments

b) **Chairman**, Central Research Facility, I.I.T., Kharagpur – Dec. 2006 to Dec 2009 and **Vice-chairman**, 2004 to 2006 (for 3 years).
Administrative position to run a central research facility that houses all the major analytical research instruments of the Institute (TEM, SEM, XRD, OES, DSC, MS, CD, FTIR, etc.)

c) **Professor**, Department of Metallurgical & Materials Engineering, I.I.T., Kharagpur – Jun. 2003 onwards.
Teaching in under- and post-graduate level, Independent research (Institute, Sponsored, Collaborative), Research guidance, Course-curriculum and laboratory development, Consultancy, Academic services to outside agencies, Organizing short-term courses, and Rendering administrative services

d) **Coordinator**, Institute Mission Project on Nano Science & Technology – 2003-2009

e) **Associate Professor**, Dept. of Metallurgical & Materials Engineering, I.I.T., Kharagpur – Mar.1997 to Jun. 2003.
Teaching in under- and post-graduate level, Independent research (Institute, Sponsored, Collaborative), Research guidance, Course-curriculum and laboratory development, Consultancy, Academic services to outside agencies, Organizing short-term courses, and Rendering administrative services.

f) **Assistant Professor**, Dept. of Metallurgical & Materials Engineering, I.I.T., Kh aragpur – Nov.1990 to Feb.1997.
Teaching in under- and post-graduate level, Independent research (Institute, Sponsored, Collaborative), Research guidance, Course-curriculum and laboratory development, Consultancy, Academic services to outside agencies.

g) **Lecturer**, Dept. of Metallurgical Engineering, I.I.T., Kharagpur - Nov. 1985 to Nov.1990.
Teaching in under/post-graduate level, Independent research (Institute/Sponsored), Research guidance (B.Tech/M.Tech), Laboratory development, etc.

Long Leave Periods: Nov1988 to Mar1990 (MPI, Germany); Jul2000 to Jun2002 (NTU Singapore; Univ Ulm, Germany); Mar2010 to Nov2017 (CGCRI; IIT Kanpur)

ADMINISTRATIVE POSITIONS HELD IN IIT Kharagpur:

- Acting Head, Department of Metallurgical & Materials Engineering (summer quarter, 2008)
- Chairman, Central Research Facility (2006 – 2009)
- Vice Chairman, Central Research Facility (2004-2006)
- Coordinator, Nano Science and Technology (2004 – 2010)
- Faculty adviser and Mentor to selected group of undergraduate students
- Professor-in-charge of X-ray diffraction and Heat Treatment Laboratories
- Professor-in-charge, FE-SEM and PLD laboratory (2006-2010)
- Professor-in-charge of Departmental Workshop (2004-2007)

D. Academic visits abroad (on leave from IIT Kharagpur):

a) **Visiting Scientist**, National Institute of Materials Science, Tsukuba, Japan – May-Jun 2009
Independent research on structure of amorphous solids (~ 2 months)

b) **Visiting Professor**, University of Ulm, GERMANY – May-July, 2007 (2 months)
Independent research on phase transformation and deformation behavior of metallic glass

c) **Visiting Professor**, Technical University of Clausthal. Germany – May'06 to July'06
Collaborative research on ECAP consolidation of amorphous Al alloy powders (DFG project). Also, visited/lectured at the University of Chile, Santiago (June 12-20, 2006).

d) **Visiting Professor**, University of Tennessee, Knoxville, USA – May'05 to June'05
Collaborative research on laser surface amorphization (DST-NSF project). Also, visited and lectured at the University of British Columbia, Vancouver, Canada during July 1-9, 2005

e) **Visiting Professor**, ENISE (National School of Engineering), Saint Etienne, FRANCE – May'04 to June'04
Independent research in surface engineering and curriculum development

f) **Humboldt Fellow**, University of Ulm, GERMANY – Jul'01-Jun'02, Dec'02, May-Jun'03
Independent research on Amorphous Al-alloys and Phase Transition in nanocrystalline materials under severe plastic deformation

g) **Senior Fellow**, School of Materials Engineering, Nanyang Technological University, SINGAPORE - Jul. 2000 to Jun. 2001.
Visiting faculty position - teaching, research and administration. Entrusted to initiate a post-graduate course on thermodynamics for the first time, revise under-graduate curriculum and take up special projects.

h) **Guest Scientist**, Max-Planck-Institut fuer Metallforschung, STUTTGART – Oct. 1999 (1 month), Jun.-Jul., 1998 (1 month), Jun.-Jul., 1997 (1 month), May-Jul., 1996 (2 months), Oct.-Nov., 1995 (2 months).
Collaborative research.

i) **Visiting Fellow**, Laser Lab., Mechanical Engg. Dept., University of Liverpool, U.K. - May-Jun., 1999 (1 month), May-Jun., 1998 (6 weeks), Mar.-Jul. 1995 (5 months).
India-UK Collaborative Research Project; and Independent post-doctoral research as an Indian National Science Academy (INSA) - Royal Society Exchange Fellow.

j) **Guest Scientist**, Technical Univ., CLAUSTHAL – May, 2000 (1 month), - Dec., 1999 (1 month), May-Jun. (1 month), 1997.
Guidance of doctoral study and collaborative research.

k) **Guest Scientist**, Technische Universitaet, BERLIN - Dec., 1995 (1 month).
Independent research as a DAAD Re-invitation Fellow.

l) **Guest Scientist/DAAD Fellow**, Max-Planck-Institute fuer Metallforschung, STUTTGART (1 year) - Mar.1989 to Mar.1990 (*on leave from the IIT-Kharagpur*).
Independent post-doctoral research as a DAAD Fellow.

m) **Engineer**, Forge shop, Mishra Dhatu Nigam (A Govt. of *India Integrated Superalloys plant*, Ministry of Defense), HYDERABAD, A.P. India - Dec.1984 to Nov.1985 (1 year).
Supervision of the production schedule.

n) **Teaching Assistant**, Dept. of Metallurgical Engg. I.I.T., KANPUR, India - Jan.1984 to Dec.1984 (1 year).
Rendering assistance for checking answer scripts, holding laboratory, sessional & tutorial classes, etc. (awarded to the class topper in merit list).

o) **Vacational Trainee**, Durgapur Steel Plant, Steel Authority of India, DURGAPUR, India – May'82 to Jul.'82.
Summer Training in an industry as a part of the undergraduate degree program.

p) **Vacational Trainee**, Andrew Yule Co., KALYANI, W.B., India – May 1981 to Jul. 1981.
Summer Training in an industry as a part of the undergraduate degree program.

9. Academic/Professional Awards and Recognition:

[A] Election to Fellowship/Membership of Scientific Peer Body/Society/Academy:

1. JC Bose Fellow, Department of Science and Technology (**DST**), Government of India, 2012-17 and 2017-present
2. Honorary Member, Indian Institute of Metals (**IIM**) awarded on Nov 14, 2017 (NMD award) as the immediate past President (2016-17)
3. Member of the Fellow of The World Academy of Sciences (**TWAS**), 2016
4. Member (Fellow), Asia Pacific Academy of Materials (**APAM**), 2014
5. Fellow, Indian National Science Academy, (**INSA**), New Delhi, 2010
6. Fellow, Electron Microscopy Society of India (**EMSI**), Kolkata, 2011
7. Fellow, West Bengal Academy of Science & Technology (**WAST**), Kolkata, 2010
8. Fellow, Indian Academy of Sciences (**IAS**), Bangalore, 2008
9. Fellow, The National Academy of Sciences, India (**NASI**), Allahabad, 2005
10. Fellow, Indian National Academy of Engineering (**INAE**), New Delhi, 2005
11. Fellow, Institution of Engineers (India), **(IE(I)** Kolkata, 2005
12. Life Fellow, Indian Institute of Metals (**IIM**), Kolkata, 2005
13. Fellow, Indian Ceramic Society (**ICS**), Kolkata, 2012
14. Member, National Academy of Sciences (**NASI**), Allahabad, India, 2003

[B] Awards, Prizes and Distinctions (National / International):

1. Conferred with **Honorary Doctor of Science** Degree by University of Kalyani, West Bengal (September 2017)
2. Awarded **MRSI Distinguished Lecture prize 2017** at the MRSI-AGM at IIT Bombay on 15.02.2017
3. Conferred with **Honorary Doctor of Science** Degree by Kazi Nazrul University, Asansol, West Bengal (January 2017)
4. **Distinguished Alumnus Award**, IIT Kharagpur, 2016 (62^{nd} Convocation).
5. **Gopal Tripathy Memorial Lecture Award**, Banaras Hindu University (Chemical Engineering), 2015
6. **TWAS Prize for Engineering Sciences**, The World Academy of Sciences (TWAS), Trieste, 2014
7. **Distinguished Alumnus Award** from Bengal Engineering and Science University (formerly, Bengal Engineering College and presently converted to Indian Institute of Engineering Science and Technology, IIEST), Shibpur, Howrah, W.B. India in Feb 2014.
8. **J C Bose Fellowship** of Department of Science & Technology, India (2012-2017).
9. **Platinum Jubilee Medal Lecture**, 98th Session of the Indian Science Congress (held in Chennai, 2011).
10. **INAE Visvesvarya Chair Professor** (2009-2011) – Awarded by the Indian National Academy of Engineering (INAE), New Delhi.
11. **G D Birla Gold Medal**, 2008 (Awarded by the Indian Institute of Metals for outstanding contributions in Materials Science and Engineering).

12. **INAE-AICTE Distinguished Industry Professor** (2007-2009), awarded by the Indian National Academy of Engineering (INAE) jointly with Tata Steel, Jamshedpur.
13. **Metallurgist of the Year Award**, 2002 (Awarded by the Ministry of Steel and Mines, Government of India through the Indian Institute of Metals).
14. **Alexander von Humboldt Fellowship**, Germany, 2001(Awarded by the AvH Foundation, Germany for independent research).
15. **Materials Research Society of India (MRSI) Medal**, 2000 (Awarded by the Materials Research Society of India).
16. **Binani Gold Medal, 1999** (Awarded by the Indian Institute of Metals (IIM) to the co-author of the best paper published in the Transactions of the Indian Institute of Metals in a calendar year).
17. **Mouat Medal (Calcutta University)** - 1999 (Awarded for the successful completion of the Premchand Roychand Studentship, a post-doctoral research scheme of the Calcutta University)
18. **Outstanding Referee Citation and Prize of Acta Materialia** 1999 (Awarded to 10 out of 900 referees for Acta/Scripta Materialia journals, Elsevier Science)
19. **Research Grant, GTZ-Germany 1997-1999** (Awarded by the Deutsche Gesellschaft fuer Zussamenarbeit (GTZ) GmbH).
20. **DAAD Re-Invitation Fellowship**, 1995-1996 (Awarded by the German Academic Exchange Service, Bonn, Germany).
21. **Career Award for Young Teachers,** 1995 (Awarded by the All India Council of Technical Education, New Delhi).
22. **International Exchange and Scientific Collaboration Fellowship**, 1994 (Awarded by Indian National Science Academy, New Delhi and Royal Society, London).
23. **INSA Medal for Young Scientist**, 1992 (Awarded by the Indian National Science Academy, New Delhi).
24. **Premchand Roychand Scholarship** (PRS), 1992 (Awarded by the Calcutta University for post-doctoral research).
25. **Young Metallurgist Award**, 1991(Awarded by Ministry of Steel and Mines, Government of India through Ind. Inst. of Metals).
26. **Deutscher Akademischer Austauschdienst** DAAD Fellowship, 1988-90 (Awarded by the German Academic Exchange Service for postdoctoral research).
27. **Rai Bahadur J. N. Ghosh Memorial Scholarship**, 1986 (Awarded by the Calcutta University for higher research in overseas).
28. **National Scholarship**, 1977 (Awarded by Ministry of Culture, Government of India for Securing 43rd position in Secondary Examination among more than 120000 students in the state of West Bengal).

[C] Professional Recognition, Election and Distinctions (National / International):

1. **Chairman, International Review Committee** for the Herbert Gleiter Institute at the Nanjing University of Science and Technology (NJUST), China on May 22-23, 2017
2. **Expert member** for the Engineering and Technology Section of the **INSA INSPIRE Faculty Award Scheme of the Ministry of Science and Technology**, Department of Science and Technology (2014, 2015, 2016, 2017); Currently the **Chairman of the Section**.

3. Visited **Iran** during November 26-29, 2016 as part of **Directors of IITs delegation** for meeting with Heads of highly reputed Universities and National Research Institutions in Iran for academic collaborations and agreements to promote Science and Education between Iran and India.
4. Elected **President**,, Indian Institute of Metals (**IIM**) (2016)
5. Elected **Expert member** on the Governing Board of Steel Research & Technology Mission of India (**SRTMI**) constituted by **Ministry of Steel**, Govt of India
6. Elected **Vice President**, Indian National Academy of Engineering (**INAE**), New Delhi, India (2015-2018).
7. Led a 10 member scientific delegation of the Indian National Academy of Engineering (**INAE**) to **USA** for scientific collaboration and exchange in the area of "Technology Domains and Grand Challenges" with the National Academy of Engineering, Washington DC, USA during Dec 18-19, 2014.
8. Invited to visit **Australia** as a member of CEO's delegation **during the visit of the Hon'ble Prime Minister of India** on November 15-20, 2014. Indian Institute of Technology Kanpur and University of Melbourne agreed upon and signed a Memorandum of Understanding for collaboration in academic and research activities.
9. Invited to visit **Norway and Finland** as part of the official delegation **during the State visit of the Hon'ble President of India** from 12 October to 17 October 2014. During the visit besides various collaborative meetings various MoUs were exchanged between IIT Kanpur and various institutions of Norway and Finland. The Director, IIT Kanpur signed an Memorandum of Understanding Between Consortium of Finnish Higher Education Institutions, Finland and Indian Institutes of Technology, India.
10. Led a 15 member **scientific delegation** (senior and young) of the Indian National Science Academy (INSA) to **Germany** for scientific collaboration and exchange in the area of "NanoSciences" with the National Academy of Sciences, Leopoldina, Halle, Germany during Nov 25-26, 2013
11. Elected the **Chairman**, Metal Sciences Division and Vice President, Indian Institute of Metals (**IIM**), India (2013).
12. **Chairman**, Selection Committee of Council of Scientific and Industrial Research (CSIR) to select the research scholars (JRF/SRF/RA) in Engineering Sciences (ENG-41), 2012, 2013, 2014, 2015.
13. **Member**, Expert Committee for the special schemes of the Council of Scientific and Industrial Research (CSIR) to select projects for funding under NMITILI scheme and select companies for CSIR Foundation Day award.
14. **Member**, Research Board, H R Johnson Ltd. (Prism Cement Group), Mumbai, 2010-2012.
15. **Member**, Senate, West Bengal University of Technology (WBUT), Kolkata, India, 2010-2012.
16. External Expert, Study Circle, Department of Metallurgical Engineering, Jadavpur University, 2010-2012.
17. **Member**, Board of Studies, Dept of Metallurgy & Materials Engineering, Bengal Engineering & Science University (BESU), Shibpore, Howrah, W.B. 721103, 2010-2012.
18. **President**, Materials Science Section, 97th Indian Science Congress (held in Trivandrum, Jan. 3-7, 2010) of the Indian Science Congress Association, Kolkata, 2009-10.

19. **Co-Chairman**, 63rd Annual Technical Meeting of the Indian Institute of Metals (IIM) held in Science City, Kolkata during Nov 13-17, 2009.
20. **Member**, Research Council, NML, Jamshedpur (2007-2009 and 2010-2012); National Physical Laboratory (NPL) New Delhi (2010–2012, 2012-present), and Central Mechanical Engineering Research Institute (CMERI) Durgapur (2010-2012).
21. **Member**, National Organizing Committee of the Annual Technical Meeting of the Indian Institute of Metals in 2005 (Chennai), 2006 (Jamshedpur), 2007 (Mumbai), 2008 (Jamshedpur), 2009 (Kolkata), 2010 (Bangalore), 2011 (Hyderabad), 2012 (Jamshedpur, 2013 (Varanasi), and 2014 (Pune).
22. **Honorary Advisor**, DAAD (German Academic Exchange Service) 2006-2009.
23. **Member**, Program Advisory Board, NANO-2006 (An International Conference in Bangalore in Aug. 2006).
24. **Council Member**, Indian Institute of Metals for 2004-05, 2005-06, 2006-07, 2007-08, 2008-09, 2009-10, 2010-11, 2011-12. Also, In-charge for IIM web site (www.iim-india.net)
25. **International Advisory Committee Member** and Session Chair, Interfaces in Advanced Materials (IAM-03), held in Chernogolovka, Russia during May 26-30, 2003 (an international conference on interfaces).
26. **Session Chair**, Nano-2002 International Conference on Nanomaterials (Held in Orlando, USA during Jun. 16-21, 2002).
27. **Session Chair**, TMS Annual Meeting on Surface Engineering (Held in Nashville, USA during Mar. 13-16, 2000).
28. **Recorder**, Materials Science Section, I.S.C.A., 1998-99 and 1999-2000 (Elected by the Indian Science Congress Association, Calcutta).
29. **Key Note Addresses** in the 50th (1996) and 51st (1997) Annual Technical Meetings of the Indian Institute of Metals held in New Delhi and Jamshedpur.
30. **Member**, Materials Science Sectional Committee, Indian Science Congress Association (ISCA), 1997-98, 1995-96 and 1992-94 (Elected by the Indian Science Congress Association, Calcutta).
31. Institute Scheme for Innovative Research and Development (ISIRD) 1992-93 (Awarded by IIT, Kharagpur to young faculty members as research seed money).
32. Partial Travel Assistance, 1991 and 2000 (Provided by DST, AICTE and CSIR to attend International Conferences abroad).

[D] Awards / Prizes in National/International Conferences:

1. Best Paper Award at the Annual Technical Meeting of Indian Institute of Metals, 2008 [For the paper: “Nano-intermetallic dispersed amorphous Al-alloy” by D Roy, I Manna]
2. Best Paper Award for our work on ‘Nanofluid’ presented in:
   (a) International Conference on Advanced Materials Design and Development (ICAMMD-06), December 14-17, 2005, Goa, India.
   (b) International Conference on Nanoscience and Technology (ICONSAT-2006), March 16-18, 2005, New Delhi, India
   (c) National Seminar on Advanced in Nano, Metallic and Ceramic Composite, February 23-24, 2006, Trivandrum, India
3. Best Paper Award, Metallurgical & Materials Engineering Division, 18th Indian Engineering Congress, (held in Lucknow, Dec. 19, 2003) (Awarded by the Institution of Engineers (India) for the best paper in their Journal).

4. Best Paper Award, 51st Annual Technical Meeting of the I. I. M., 1997 (held at Jamshedpur) (Awarded by the Indian Institute of Metals for the best poster paper - as a co-author).

[E] Editorial and Reviewer Assignments in National/International Journals:

1. Editorial Board Member, High Temperature Materials and Processes (Editor-in-Chief: Fukuyama, Hiroyuki); Publisher: DeGruyter, Germany www.degruyter.com/page/flavor (2010-2017).
2. Member, Editorial Board, Indian Ceramic Society; Indian Inst of Ceramics (2012).
3. Vice President, Millenium Institute of Engineering and Management (MIEEM), Kolkata (2011-12).
4. Associate Editor, Bulletin of Materials Science (Springer) – 2010-2012, appointed by the Indian Academy of Sciences Bangalore.
5. Editorial Board Member, Lasers in Engineering, Published by Old City Publishing Co. USA (2010).
6. Key Reader, Metallurical and Materials Transactions A, The ASM flagship Journal (Trans AIME), 2009-present (Appointed by the Metall. & Mater. Trans Board).
7. Member, National/International Advisory Committee, ASIA STEEL 2009 (organized by POSTECH, South Korea); MATS-2008 and ISCS-2008 (organized by Tata Steel); ICAMT-2008, ICONSAT-2008 organized by IGCAR+INAE.
8. Member, Editorial Board of STEEL TECH, a bi-monthly bulletin on Steel published by Tata Steel (2000-2008).
9. Guest Editor, Special Issue on Nanoscience and Technology, Transactions of the Indian Institute of Metals [Vol. 58(6), 2005].
10. Deputy Managing Editor, Metal News, A bi-monthly bulletin of the Indian Institute of Metals, Kolkata – 2005 to 2010.
11. Guest Editor, Special volumes on ‘Surface Engineering of Steel’ (2 special issues) in STEEL TECH, a quarterly journal on Steel Technology, Editor: Dr Amit Chatterjee (August and October 2008).
12. Member, Board of Editors, Computers, Materials and Continua – A new Tech Science Press international journal (ISSN 1546-2218), California, USA.
13. Member, Editorial Advisory Committee, Transactions of the Indian Institute of Metals, 2003.
14. Guest Editor, Special Issue on ‘Nano Science and Technology’ of the Trans. Indian Institute of Metals, vol. 58(6) (2005) pp. 939-1227 (27 articles, 288 pages).
15. Reviewer, Acta/Scripta Mater, Surf Coat Technol, Appl Surf Sci, Langmuir, Mater Sci Engg A/B, Wear, Mater Chem Phy, Appl Phy Lett, J. Appl. Phy., J.Mater. Res, Philos Mag, Metall Mater Trans A, Trans Ind Inst Met, Bull Mater Sci .

[F] Contribution to National Mission/Projects:

- **IMPRINT India:** The ambitious program of the Government of India called IMPacting Research INnovation and Technology (IMPRINT) is a first of its kind Pan-IIT + IISc joint initiative to develop a Roadmap for Research to solve major engineering and technology challenges in selected domains needed by the country. This is a national initiative steered by MHRD to translate research and innovation in engineering and technology into viable technology through collaboration among various engineering institutions, R&D organizations,

government agencies and industry. This unique initiative to address major engineering challenges faced by the nation was launched by Hon'ble President, Hon'ble Prime Minister and Hon'ble Human Resource Minister at Rashtrapati Bhawan on 05.11.2015. Each of the 10 domains is coordinated by one of the IITs or IISc and **IIT Kanpur** has been vested with the responsibility of **National Coordinator**. Each domain is served by a Domain Expert Committee (DEC) who in turn report their overall progress to the National Apex Committee chaired by Additional Secretary, Higher Education, MHRD. Detail of this initiative is available at (http://imprint-india.org/). In the first round of this noble initiative 259 proposals were selected after several rounds of rigorous evaluation for funding by MHRD and partner ministries out of 2612 initially submitted projects against 'National Call for Proposal' in 2016. At the moment, 142 out of 259 projects approved in principle are under progress with 50% funding from MHRD and remaining 50 % from one of the partner ministries with a total plan outlay of about Rs 400 crore in 3 years. An EFC and cabinet note for IMPRINT II (2017-2020) is now under active consideration with myself as the National Coordinator.

- **GIAN Initiative:** IIT Kanpur is an active participant of the GIAN initiative (Global Initiative for Academic Networks) of Government of India with 19 approved courses.
- **GRBMP:** IIT Kanpur is among the consortium of 'seven Indian Institutes of Technology' formed to prepare comprehensive River Basin Management Plan for Ganga with the objectives of taking comprehensive measures for restoration of the wholesomeness of the Ganga ecosystem and improvement of its ecological health, with due regard to the issue of competing water uses in the river basin. The present project named Namame Gange is under progress with Director, IIT Kanpur as the National Coordinator. .

[G] Academic Distinctions:

1. **Topper** in M.Tech. Final Exam. (1984) - I.I.T., KANPUR.
2. **2nd Topper** in B.E. Final Exam. (1983) - B.E.College (Calcutta University).
3. **43 rd Rank** in the Madhyamik Pariksha (secondary examination (class X).

10. Specialization and Major Fields of Interest:

PHYSICAL METALLURGY and MATERIALS ENGINEERING
(Phase Transformation; Microstructure-Property-Process Parameter Correlation)

a) Nanocrystalline Materials: Evolution of phases including new metastable/polymorphic phases, crystal to glass and glass to nanocrystal transition under non-equilibrium processing condition. Development/preparation of nanometric, intermetallic and amorphous alloys and composites by mechanical alloying and characterization of microstructure and its stability by TEM, DSC, XRD, PAS, NMR.

Synthesis/characterization of nanofluid for advanced thermal engineering. Compaction/sintering by microwave and extreme pressure. Nanocrystalline hydrides for refrigeration, fuel cell and hydrogen-storage applications.

b) Surface Engineering: Laser, plasma ion implantation and electrodeposition assisted surface modification under extreme conditions of rapid thermal quenching to improve resistance to wear, corrosion, etc. by formation of a metastable microstructure (extended solid solution/amorphous phases) and/or composition in the near-surface region, characterization by the electron-optic analytical techniques, X-ray diffractometry/ spectrometry, and testing of the mechanical and electrochemical properties. Microstructural evolution in welding, cladding, rapid manufacturing and similar processing under extreme conditions.

c) Mathematical Modeling: Mathematical modeling of thermal and mass transfer profile in laser material processing. Developing suitable mathematical models to correlate the microstructure/composition with properties by analytical/numerical techniques to simulate the temperature/compositional distribution profile following mechanical alloying (by high-energy ball milling), plasma ion implantation, discontinuous precipitation. Thermodynamic modeling of solid-state amorphization, metal-hydrogen equilibria, phase transition, etc.

d) Interface Diffusion and Related Phase Transitions: Determination of Arrhenius parameters of grain/interphase boundary diffusion through kinetic analysis of interface diffusion controlled phase transition like discontinuous precipitation, eutectoid reaction; and studying the concerned micro-mechanism in iso-thermal/stress/strain conditions.

e) Material Development: Developing suitable materials/processes for industrial applications (e.g. nanofluid, austempered ductile iron, nano-metal hydride).

f) Texture: Development of a suitable preferred orientation in polycrystalline aggregates to induce an optimum level of soft magnetic property, etc.

11. Summary of Research Output:

1. THESIS GUIDANCE: *Ph.D* = **20 (completed) + 04 (in progress)**
   M.Tech/MS = **33 (completed) + 02 (in progress)**
   B. Tech = **42 (completed)**
2. PUBLICATION: *Journal* = **250 (Published)**
   Conf. Proc. = **41 (Printed)**
   Books/Journals edited = **06**
   Chapters written in books = **03**
   ***h* index = 35** (Scopus)**, 34** (Web of Science)
   As lecture notes in short term course = **24**
   Invited papers (presentation only) = **67 + 44 = 111**
   In seminar/symp./conf. (abstracts) = **116**
4. PATENT: = **1 (granted) + 2 (filed)**
5. SPONSORED PROJECTS (as PI): **32** worth over **Rs. 160 million** (only at IIT Kharagpur during 1990-2009)

12. Most Significant Research Contributions:

Prof. Manna's research endeavors concern the broad area of **phase transformation and structure-property correlation in engineering materials including nanometric solids (metallic/ceramic) and nanofluids, surface engineered metallic and ceramic systems including steel, composites and coatings**. The most significant contributions made by him in this direction are summarized below.

1. On Nanostructured and Amorphous Materials:

Prof. Manna's interest lies in **synthesis, phase transformation, properties and application of nano-structured materials** prepared by mechanical alloying/milling. The major contributions:

- **Al-alloy composites**: Developed a new series of Al-based simple ternary **Al-Cu-TM/Al-TM-Si** alloys (TM = early transition metals = Ti, Nb, Zr) by mechanical alloying amenable to forming **an amorphous phase dispersion in nanocrystalline matrix, or nano-intermetallic dispersion in amorphous or nanocrystalline matrix** either during controlled milling or subsequent annealing. A number of other Al-based composites (AlNiTi, ACuCr and Al + stainless steel) have also been developed. A **patent** has recently been granted on the **Al-Cu-Ti** system. Recently, utilized ball milling to develop ultrafine fly ash for structural application.
- **Nanofluid**: Developed **nanofluid** (stable colloidal dispersion of nanometric metallic (Al-alloy) or ceramic (zirconia/titania) particles (< 1 vol.%) in water or ethylene glycol) by single- or two-step synthesis process and obtained **50-100% increase in thermal conductivity ratio**, ideal for advanced heat transfer applications. Also, investigated the role of aspect ratio, volume percent size and chemistry of nanoparticles on conductivity ratio.
- **Size-dependent polymorphism**: Discovered **bcc→fcc** (in Nb) and **hcp→fcc** (in Zr, Ti) **polymorphic transformation** in early transition metals during mechanical attrition due to **nanocrystallization and high degree plastic strain/strain-rate**. Also, proposed a thermodynamic model based on isothermal equation of state to explain the genesis of such transformation upon nanocrystallization and proved that the said change is not impurity driven and could be reversible. Similar transformation has since been report in other ceramic and metallic alloys.
- **Functional nanomaterials**: Synthesized **nanocrystalline superparamagnetic** (H_c < 1 Oe) Mn-Zn spinel-ferrites, nano-oxides for memory devices, electrolytes in solid oxide fuel cell, polymers for photovoltaic packaging and most recently, ZnO+SnO_2 hybrid with varying size, shape and morphology for gas sensors.
- **Synthesis of nanoalloys**: Developed several **nanocrystalline aluminides** (Nb-Al, Cu-Al, Ni-Al) and □**-brass** at room temperature with *metastable* microstructure or composition from elemental powder blend by mechanical alloying.

2. On Surface Engineering:

Dr. Manna has made a number of noteworthy contributions in the area of laser or plasma assisted surface engineering to enhance surface dependent properties like wear, corrosion and oxidation resistance of metallic systems.

(a) Laser Surface Engineering (LSE): Majority of these efforts were based on various innovations and strategies based on laser surface alloying (LSA), cladding (LSC), melting (LSM), hardening (LSH) or composite surfacing (LCS) of different ferrous and non-ferrous metallic metals/alloys:

- Explored developing Fe-Cr-Mo-Y-B-C **amorphous/glassy coating on steel substrate** to enhance wear resistance and investigated the role of substrate in heterogeneous nucleation or epitaxial growth.
- Improved **oxidation and wear resistance of Ti** by laser surface alloying (LSA) with Si, Al or Si+Al forming Ti_5Si_3-rich layer and established the concerned **mechanism and kinetics** of oxidation and wear resistance due to Ti_5Si_3-rich layer.
- Developed a new strategy of **laser assisted composite surfacing** (LCS) (compositional grading of surfaces with varying degree of dispersion) to significantly enhance wear resistance of components based on A**l/Al-alloys**, **Cu/Cu-alloys**, **Mg-alloys** and **mild/stainless steel**.
- Enhanced **wear and erosion resistance** (both at room/high temperature) of Cu by LSA with Cr by solid solution and dispersion hardening. A process map on variation of surface microstructure, composition and hardness as a function of laser parameters has been established.
- Improved **corrosion and wear resistance of Mg-alloys** by laser surface melting (LSM), LSA with Al+Mn or thermal oxidation, and studied the defect structure and its influence on corrosion and wear resistance.
- Enhanced **oxidation resistance of 2.25Cr-1Mo ferritic stainless steel** by LSA with Cr, **nimonic superalloy with Si+Al** and **pitting and general corrosion resistance and wear resistance** of AISI 304/316 austenitic stainless steel by LSA with Mo.
- Developed high specific surface area **neural stimulation electrode material** by LSA of Ti with Ir and mimic the spatio-temporal profile of neuronal activation to cure neuronal disorders (like tinnitus, cardio-vascular stimulation, etc.).
- Demonstrated *for the first time* that **laser surface hardening (LSH)** is more appropriate for enhancing wear and fatigue resistance of austempered ductile iron than that by LSA or laser surface melting due to a residual compressive stress on the surface.
- Proved that **LSH of plain carbon and ball bearing steel** could provide equivalent hardening of surfaces as that in bulk hardening operations.
- Explored **laser assisted deposition of Co**, **surface melting**, **oxidation** or **laser nitriding** of Ti6Al4V based bio-implants for developing prosthesis with enhanced surface functionality.
- Investigated laser bending steel and residual stress associated with it.
- Published several **invited review** articles on different aspects of LSE.

(b) Plasma Surface Engineering (PSE):

- Enhanced wear and corrosion resistance of ball bearing steel by different surface engineering approaches (gas and plasma nitriding, plasma ion implantation) to enhance hardness and corrosion resistance of stainless and ball bearing steel. Prof. Manna installed a plasma-immersion-ion-implantation (PIII) facility in 2000 with a DST project, which has now been upgraded to an indigenously designed/developed plasma assisted implantation and deposition (PAID) unit (**a new hybrid deposition and implantation technology**) through another DST funding in 2005. This is the first university based PIII/PAID laboratory in India (for metallic/ceramic components).

(c) Supplementary Studies on Surface Engineering:

- Earlier Prof. Manna developed a novel technique of **enhancing diffusion coating kinetics** by increasing specific boundary area on surface through controlled surface deformation and diffusion annealing. A similar method, called SMAT, has now been commercialized.

- Developed a **co-deposition technique** to apply nano-aluminides on surfaces of copper to enhance wear resistance without deteriorating electrical conductivity. This is the first time that co-deposition of nano-aluminide/intermetallic has been possible.
- Achieved **laser assisted bending** of stainless steel (for automobiles) and **laser assisted fabrication** of stainless steel.
- Initiated a new program on **laser assisted transmission lap welding** (transparent sheet on translucent substrate) of polymeric sheets.
- Initiated a program on **electron beam assisted welding** of dissimilar nuclear grade metals/alloys (Nb, Zr alloys, stainless steel, Cu), and thermal spray deposition on steel.
- A new initiative is being undertaken to develop **plasma assisted jet vapor deposition** (PEJVD) as a new Zn-free coating technology for steel in collaboration with Tata Steel and FCIPT-Gandhinagar.

3. On Moving Boundary (Discontinuous or Invariant) Reactions:

Prof. Manna has made a commendable contribution in furthering the knowledge concerning discontinuous reactions, particularly, discontinuous precipitation (DP) and coarsening (DC) including publishing three review articles and numerous papers in specific areas of mechanism and kinetics like:

- Reported **occurrence of DP/DC** in several new binary systems *for the first time*: Cd-Ag, Zn-Al, Zn-Ag, Zn-Cu.
- Established that the **dynamic properties** (diffusivity, mobility, etc.) of the grain vis-à-vis interphase boundaries are comparable in moving boundary reactions and proved that grain boundaries undergo no structural transformation to attain mobility from static condition in moving boundary reaction (hence static/dynamic boundaries have same structure). In this regard, a **generalized criterion** for selection of the initiation sites for DP and DC from among different types of natural and/or synthetic grain and phase boundaries, including the necessity or otherwise of maintaining Livingston-Cahn relation was proposed. Indeed, it was shown that initiation of DP is feasible from interphase boundaries and a **new mechanism** of DP initiation from interphase boundaries was formulated *for the first time*
- Proposed a new **resistometric method** of determining **metastable solvus** for DP], and detecting a **clustering reaction** (D_V-controlled) preceding DP in Pb-Sn for the first time.
- Developed a novel technique of **determining the Arrhenius parameters of boundary diffusion** through kinetic analysis of DP and DC. Utilizing this, he has determined boundary diffusivity through kinetic analysis in many systems in which reliable data on the same were not available. This approach is proven applicable in principle to all moving boundary reactions.
- Resolved the controversy about the effect of ternary addition on DP kinetics and proving that '**solute drag**' exerted by the ternary atoms, neither atomic size difference nor valence electron difference constitutes the main mechanism of retarding the DP kinetics.
- Reported that **volume diffusion controlled metastable decomposition** (say, clustering) precedes boundary diffusion controlled eutectoid reaction in Cu-In or DP in Zn-Al or Pb-Sn *for the first time*.

4. On Mathematical/Thermodynamic Modeling:

Prof. Manna has utilized mathematical modeling as a tool for investigating the mechanism and simulating the kinetics of several phase transitions.

- **Moving Boundary Phase Transition**: Contributed significantly towards **developing analytical/numerical models of peritectic and peritectoid** transformation kinetics that showed better insight into the transformation mechanism and better agreement with experimental data.
- **Synthesis and Properties of Nanostructured Materials**: Proposed a **numerical model of mechanical alloying kinetics** capable of considering the concentration dependent diffusivity, interface shift, and introducing the idea of an '*effective temperature*' of diffusion in mechanical alloying *for the first time*. Correlated the **excess free volume or volume per atom in nanocrystals with grain size** and accounted for the "*inverse Hall-Petch*" relation, "*enhanced diffusivity*" and "*polymorphism*" in terms of negative hydrostatic pressure generated due to nanocrystallization (crystallite size reduction beyond a critical level). Proposed **a mathematical model of milling dynamics** to predict the optimum conditions of mechanical alloying to develop nanocrystalline alloys.
- **Heat Transfer in LSE**: Developed transient or steady state models of LSA (under pre-deposition scheme) based on explicit finite difference technique to predict the temperature profile, thermal history and microstructure of the alloyed zone. This has been the maiden effort to model LSH or LSA involving transient melting and solidification of a bi-metallic layer. A similar model is applied to model the effect of laser assisted austenitizing on degree/uniformity of martensitic change in LSH of steel by self quenching.
- **DP Kinetics**: Modified the Cahn's equation to **analytically predict the solute distribution profile** in solute depleted matrix behind the reaction front in DP that shows excellent agreement with experimental data.
- **Frictional Heating**: Modeled **the heat transfer process** during a pin-on-disc wear-testing operation to demonstrate that accumulation of frictional heat may irreversibly degrade the microstructure.
- **Solid State Amorphization**: Applied **empirical thermodynamic model** of Miedema to predict phase evolution including the genesis of **solid state amorphization** in mechanically alloyed Al-alloys.
- **Austempering**: Analyzed heat transfer in a engineering components of complex shape during austemepering by finite element modeling.

5. Physical Metallurgy of Steel and Cast Iron:

- Studied microstructural stability of FeCrB or FeCrNiCoB glassy alloys subjected to simulated high stain rate deformation (milling).
- Developed bainitic microsructure in SAE 52100 steel in order to explore the possibility of developing tougher bearing material by austempering instead of conventional practice of achieving tempered martensitic microstructure by hardening and tempering.
- Proposed an innovative combination of creating martensitic surface by laser surface hardening on bainitic core (developed by austemepring) in SAE 52100 steel for bearing applications].
- Modeled the heat transfer condition of **austenitizing and austempering** of spheroidal graphitic iron to optimize **bainitic transformation** and microstructure.
- Studied the effect of environmental on fatigue strength (crack growth retardation) of HSLA 80A steel and effect of thermal cycling on Fe-Ni-Mn maraging steel.

6. On Texture:

Dr. Manna developed an optimum routine of cold rolling followed by recrystallization and magnetic annealing for two indigenously developed **Ti and Ti+Cr added soft**

magnetic Ni-Fe-Cu permalloys and correlated the microstructural evolution with texture/process parameters. He has recently utilized texture analysis to throw new insight into improvement in wear resistance of SAE 52100 steel by gas nitriding.

13. Sponsored Research Schemes (at IIT Kharagpur):

1. **Development, synthesis, characterization and thermo-physical property measurement of ceramic nanoparticle dispersed nanofluids for thermal applications (OLP 280)**
   (*Principal Investigator*)
   Sponsor: *Council of Scientific & Industrial Research (CSIR), New Delhi*
   Duration: 3 years
   Fund: Rs. 0.52 million (approx.)
   Status: Commenced on October 2010 (at CSIR-CGCRI).

2. **Euro-Indo forum for nano-materials research coordination & cooperation of researchers in sustainable energy technologies (RST)**
   (Co-*Principal Investigator*)
   Sponsor: *European Union FP 7) Code name: e-ICOON,* Grant agreement no.: 233466
   Duration: 4 years
   Fund: Rs. 741,428.00 (1st Installment)
   Status: Commenced in March, 2011.

3. **INAE Visvesvarya Chair Professorship (code: VVC)**
   (*Principal Investigator*)
   Sponsor: *Indian National Academy of Engineering (INAE), New Delhi*
   Duration: 2 years
   Fund: Rs. 1.83 million (approx.)
   Status: April 2009 to March 2011.

4. **Grain Boundary Segregation, Precipitate Morphology and Surface Modification in case of Complete and Incomplete Grain Boundary Wetting by a Second Solid Phase in Steels (code: GBS)**
   (*Principal Investigator*)
   Sponsor: *Department of Science and Technology (Indo-Russian Collaborative Research Project, RFBR)*
   Duration: 2 years
   Fund: Rs. 1.3 million (approx.)
   Status: Commenced on March, 2009.

5. **Nano-fluid Based Coolant and Combustion Fuel System (Code: NBS)**
   (*Principal Investigator*)
   Sponsor: *Indian Space Research Organization (ISRO) and KCSTC, IIT, Kharagpur*
   Duration: 1 year
   Fund: Rs. 0.5 million (approx.)
   Status: Commenced on April 2009.

6. **Versatile nano-zirconia for Indian rare Earth Limited, OSCOM (Code: VNZ)**
   (Co-p*rincipal Investigator*)
   Sponsor: *Indian Rare Earth Limited, Research Center, Kollam, Kerala*
   Duration: 3 years
   Fund: Rs. 4.5 million (approx.)

Status: Commenced on June 2008.

7. **Development and Characterization of Nano-fluid for Heat-Transfer Applications in Nuclear Power Plants (code: NPP)**
(*Principal Investigator*)
Sponsor: *Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam*
Duration: 2 years
Fund: Rs. 1.9 million (approx.)
Status: Commenced on May 2008.

8. **Development and characterization of copper based brazing alloy by rapid solidification and mechanical alloying (code: RSM)**
(*Principal Investigator*)
Sponsor: *Indian Space Research Organization (ISRO) and KCSTC, IIT, Kharagpur*
Duration: 1 year
Fund: Rs. 0.4 million (approx.)
Status: Commenced on April 2007.

9. **Development of Compositionally and Microstructurally Graded Thermal Barrier Coating by Plasma Spraying**
(*Co-Principal* Investigator; PI: Dr. J. Dutta Majumdar)
Sponsor: *Department of Science and Technology, New Delhi*
Duration: 3 years
Fund: Rs. 3.5 million (approx)
Status: Approved, to begin shortly after the funds are transferred.

10. **Development and characterization of Nanostructured Thin Films for SiGe Quantum Well Infrared Photodetector (QWIP) and Ferroelectric based Gas/Chemical Sensors (code: FIR)**
(*Principal Co-investigator; PI: Prof S K Ray)*
Sponsor: *Defense Research and development Organization (DRDO), New Delhi*
Duration: 5 years
Fund: Rs. 20.02 million
Status: Commenced on Aug. 2007.

11. **Establishment of an Advanced Research Facility for EB Welding and Process Development Related to Programs of Interest to DAE (code: EBW)**
Sponsor: *Board of Research in Nuclear Sciences (BRNS) and Dept. of Atomic Energy, GoI*
Duration: 3 years
Fund: Rs. 13.3 million (Rs 4.3 m from BRNS + Rs 9 m from DAE)
Status: Commenced on Mar 2007.

12. **Development of multifunctional surface on Ti and its alloys for tailoring wear resistance and biocompatibility (code: TWR)**
(*Co-principal Investigator, PI: Prof J Dutta Majumdar*)
Sponsor: *Council of Scientific & Industrial Research (CSIR), New Delhi*
Duration: 2 years
Fund: Rs. 1 million (approx.)
Status: Commenced on May 2007.

13. **Development of nanocrystalline coating by combined plasma assisted implantation and deposition (code: PAI)**
(*Principal Investigator*)
Sponsor: *Deptt. of Science & Technology (DST), New Delhi*

Duration: 3 years
Fund: Rs. 5.3 million
Status: Commenced on Mar 2006.

14. **Synthesis and Characterization of Nanostructured Materials for Functional and Structural Applications (code: SCM)**
(*Principal Investigator*)
Sponsor: *Deptt. of Science & Technology (DST), New Delhi under Nanomaterials Science and Technology Initiative (NSTI)*
Duration: 5 years
Fund: Rs. 28 million
Status: Commenced on Mar 2006.

15. **Surface Engineering of Ball Bearing Steel by Plasma Immersion Ion Implantation (code: SPI)**
(Principal Investigator)
Sponsor: *TATA STEEL, Jamshedpur*
Duration: 2 years
Fund: Rs. 1 million (approx.)
Status: Commenced on Aug., 2003.

16. **Laser Assisted Manufacturing of Compositionally Graded Coating and Drilling of Metals and Alloys**
(Co-Principal Investigator)
Sponsor: *Council of Scientific & Industrial Research (CSIR), N. Delhi*
Duration: 3 years
Fund: Rs. 1.3 million (approx.)
Status: Commenced on Mar. 2003.

17. **Laser Assisted Fabrication of Functionally Graded Component for Hip Joint and Femoral Replacement**
(Co-Principal Investigator)
Sponsor: BRNS, Department of Atomic Energy
Duration: 3 years
Fund: Rs. 1.6 million (approx.)
Status: Commenced on Aug. 2003.

18. **Thermal Performance of Nanofluid Based Cooling Systems (code: NBC)**
(*Principal Investigator*)
Sponsor: *Delphi Automotives Systems, Pvt. Ltd., Bangalore*
Duration: 6 months
Fund: Rs. 0.1 million (approx.)
Status: Completed in July 2008.

19. **Development and Characterization of Novel Nanocrystalline Metallic/Ceramic Based Hydrogen Sensor Materials (code: NNM)**
(*Principal Investigator*)
Sponsor: *Ministry of Human Resource Development (MHRD) – R&D projects*
Duration: 3 years
Fund: Rs. 1.5 million
Status: Completed in May 2008.

20. **Synthesis and Characterization of Al-based Nanocrystalline Composites (code: ANC)**
(*Principal Investigator*) – Indo-Polish Collaborative Project

Sponsor: *Deptt. of Science & Technology (DST), New Delhi and Komitet Badań Naukowych (KBN), Poland* under Scientific and Technological International Cooperation Joint Project for the years 2004-2006
Duration: 2 years
Fund: International travel and contingency, Rs. 0.3 million
Status: Completed in July 2007.

21. **Development of Wear-resistant Cu-alloy with Nanocrystalline Ceramic Phase Dispersion by Mechanical Alloying for Electrical Contacts/Components (code: DWR)**
(*Principal Investigator*)
An International Project Award (selected from 145 proposals from 27 countries)
Sponsor: *International Copper Association, USA*
Duration: 1 year
Fund: USD 22000.00
Status: Completed n Mar 2006.

22. **Production of porous TiNi shape memory alloys from mechanically alloyed powders for biomedical applications – A Fast Track Research Scheme for Dr B B Panigrahi**
(*Principal Investigator*)
Sponsor: *Deptt. of Science & Technology (DST), New Delhi*
Duration: 2 year
Fund: Rs. 1 million (approx.)
Status: Completed in December 2006.

23. **Development and Characterization of Nano-fluid for Micro-thermal Heat Transfer Applications in Advanced Satellite (code: DCN)**
(*Principal Investigator*)
Sponsor: *Indian Space Research Organization (ISRO) and KCSTC, IIT, Kharagpur*
Duration: 2 years
Fund: Rs. 0.5 million (approx.)
Status: Completed in August 2006.

24. **Synthesis and characterization of nanocrystalline ZrO_2-based electrolyte for solid oxide fuel cells (code: SOF)**
(*Principal Investigator*)
Sponsor: *Council of Scientific & Industrial Research (CSIR), New Delhi*
Duration: 3 years
Fund: Rs. 1.1 million (approx.)
Status: Completed in April 2007.

25. **High Speed Laser Synthesis of Amorphous Surface Structure (code: LSH)**
(*Principal Investigator*)
Sponsor: *Deptt. of Science & Technology (DST), New Delhi and National Science Foundation (NSF), USA*
Duration: 3 years
Fund: Rs. 1.7 million (approx.)
Status: Completed in March 2007.

26. **Development of Al-based Nanocrystalline and Amorphous Alloys by Mechanical Alloying (code: AMA)**
(*Principal Investigator*)
Sponsor: *Council of Scientific & Industrial Research (CSIR), New Delhi*
Duration: 3 years

Fund: Rs. 1.7 million (approx.)
Status: Completed in Aug. 2007.

27. **Compressor Driven Metal Hydrite Cooling and Heating Systems**
(Co-Principal Investigator)
Sponsor: Ministry of Non Conventional Energy Sources, New Delhi
Duration: 3 year
Fund: Rs. 1.7 million (approx.)
Status: Completed in Dec. 2004.

28. **Plasma Based Ion Implantation for Surface Engineering of Titanium Alloys to Improve Wear and Oxidation Resistance**
(*Principal Investigator*)
Sponsor: *Deptt. of Science & Technology (DST), Govt. of India* (under the CDPS program)
Duration: 3 years
Fund: Rs. 5.2 million (approx.)
Status: Completed in Dec 2003.

29. **Laser Surface Engineering of Magnesium and Its Alloys to Enhance Wear and Oxidation Resistance**
(*Principal Investigator*)
Sponsor: DST-DAAD Exchange Research Fund.
Duration: 2 years
Fund: Rs. 0.4 million and DM 4000.00 (approx.)
Status: Completed in Dec. 2001.

30. **Laser Surface Engineering for Enhanced Abrasion and Impact-Fatigue resistance of Excavator Components**
(*Principal Investigator*)
Sponsor: UK-INDIA Science and Technology Research Fund.
Duration: 2 years
Fund: Rs. 0.5 million and UKP 5000.00 (approx.)
Status: Completed in Dec. 2000.

31. **Laser Surface Engineering of Commercial Metals for Improved Corrosion and Oxidation Resistance**
(*Principal Investigator*)
Sponsor: Min. of Human Resource Development (MHRD), N. Delhi.
Duration: 3 years
Fund: Rs. 0.8 million (approx.)
Status: Completed in Mar. 2000.

32. **Development of Superior Corrosion and Oxidation Resistant Materials for Fast Breeder Reactors by Laser Surface Engineering**
(*Principal Investigator*)
Sponsor: *Coun. of Sci. & Indus. Res. (CSIR), N. Delhi*
Duration: 4 years
Fund: Rs. 0.6 million (approx.)
Status: Completed in Mar. 2000.

33. **Improvement in Oxidation Resistance of Nimonic Alloys By Laser Surface Engineering**
(*Principal Investigator*)
Sponsor: *All India Council of Technical Education (AICTE), N. Delh*i

Duration: 4 years
Fund: Rs. 0.6 million (approx.)
Status: Completed in Mar. 1999.

34. **Development of High Temperature Resistant Materials By Laser Surface Engineering**
(*Principal Investigator*)
Sponsor: *All India Council of Technical Education, N. Delhi*
Duration: 3 years
Fund: Rs. 0.2 million + Personal Salary for 3 years
Status: Completed in Sept. 1998.

35. **Measurement of Grain Boundary Diffusivity Through Kinetic Analysis of Discontinuous Precipitation - A Novel Technique**
(*Principal Investigator*)
Sponsor: *Coun. of Sci. & Indus. Res. (CSIR), N. Delhi*
Duration: 3 years
Fund: Rs. 0.5 million (approx.)
Status: Completed in Mar. 1996.

36. **Development of Nanocrystalline Composites by Mechanical Alloying & Characterization**
(*Co-Investigator with Prof. S. K. Pabi*)
Sponsor: *Deptt. of Science & Technology (DST), Govt. of India*
Duration: 3 years
Fund: Rs. 3 million (approx.)
Status: Completed in May 1998.

37. **Investigation into Solidification Behaviour, Thermophysical Characteristics and Mechanical Properties of Composites**
(*Co-Investigator with Profs. B. K. Dhindaw & S. C. Panigrahi*)
Sponsor: *All India Council of Technical Education (AICTE), N.Delh*i
Duration: 3 years
Fund: Rs.0.5 million (approx.)
Status: Completed in Mar. 1995.

38. **Development of Superior Corrosion and Oxidation Resistant Materials By Laser Surface Treatment**
(*Investigator-in-Charge*)
Sponsor: *Indian National Science Academy (INSA), New Delhi*
Duration: 3 years
Fund: Rs. 0.1 million (approx.); Status: Completed in Nov. '95.

39. **Development of Wear and Corrosion Resistant Materials Through Laser Surface Alloying** (*Investigator-in-Charge*)
Sponsor: *Inst. Scheme for Innovation Res. & Dev., I.I.T., Kharagpur*
Duration: 1 year; Fund: Rs. 25 k (approx.); Status: Completed in Mar. '94.

Recent Industrial Consultancy

- **Failure analysis of failed sucker rods in petroleum pipeline** (Lonestar Alpha Laboratories, Dubai)
- **Plate cooling efficiency of nanofluid for automobile applications** (DELPHI, Bangalore)

- **Characterization of spinel content in Mn-Zn ferrites** (EPCOS Ferrites Ltd., Kolkata)
- **XRD analysis of sinter products and welded joints** (Tata Steel, Jamshedpur)
- **Phase analysis of bearing steel** (Bearings Division, Tata Steel, Kharagpur)
- **Structural characterization of nanomaterials** (Vidyasagar University)
- **Volume fraction of phases** (National Metallurgical Lab., Jamshedpur)

14. Details of Courses Taught at IIT Kanpur (2012-2017):

Sl.	Subject	Number	L-T-P	Level
1.	Phase Transformation	MSE 301	2-0-0	3rd year MSE BTech + Integrated M Tech
2.	Structure and Characterization of Materials	MSE 203	3-0-0	2nd year MSE BTech + Integrated M Tech
3.	Surface Engineering	MSE 675		M. Tech + B. Tech
4.	Heat Treatment And Surface Hardening	MSE 671 A		M. Tech+B. Tech

Short Term Courses offered at IIT Kanpur:

- Taken short courses on **PGPEX-VLM**, a Post Graduate Program for Executives for Visionary Leadership in Manufacturing (VLFM), 2013, 2014, 2015, 2016. This one year full time residential program has a built in manufacturing focus that helps to appreciate an industry's metamorphosis in competitive times. The course is being conducted jointly by 3 premier institutes of India viz. IIM Calcutta, IIT Kanpur and IIT Madras

Details of Courses Taught at IIT Kharagpur (1985-2012):

1.	Phase Transformation & Phase Equilibrium	MT31003	3-1-0	3rd year MME B Tech + Integrated M Tech
2.	Phase Transformation & Heat Treatment (Theory and Laboratory)	MT34005	3-1-3	3rd year MME B Tech + Integrated M Tech
3.	Phase Transformation	MT60028	3-1-0	1st year MME M Tech
4.	Phase Transformation Laboratory	MT69008	0-0-3	1st year MME M Tech
5.	Kinetics of Metallurgical Processes	276002	3-1-0	1st year MME M Tech
6.	Surface Engineering*	274018	3-0-0	4th year MME B Tech
7.	Introduction to Materials (Theory)*	272001	3-1-0	2nd year MME B Tech
8.	Introduction to Materials (Lab.)	272901	0-0-3	2nd year MME B Tech
9.	X-ray Diffraction (Theory)	273006	3-1-0	3rd year MME B Tech
10.	X-ray Diffraction (Lab.)	MT33106	0-0-3	4th year MME B Tech
11.	Advanced Thermodynamics	27601	3-1-0	1st year MME M Tech
12.	Materials Characterization (partly)	27422	3-0-0	4th year MME B Tech
13.	Engineering Metallurgy (Theory)	27202	3-1-0	Non-dept. 2nd year B Tech
14.	Engineering Metallurgy (Lab.)	27292	0-0-3	Non-dept. 2nd year B

15.	Engineering Materials (Theory)	27421	3-0-0	Non-dept. 4th year B Tech
16.	M. Tech Seminar	27604	0-0-3	2nd year MME M Tech

(*introduced **for the first time** at the IIT, Kharagpur; MME = Metall. & Mater. Engg. Dept.)

Teaching Assignments at the Nanyang Technological University, Singapore (2000-2001):

1. Material Structure and Mechanical Behavior (theory) - 4 credit UG course.
2. Thermodynamics of Solids (theory) - 4 credit PG course - introduced for the first time in NTU.
3. Properties of steel (experiment) - UG laboratory.

Short Term Courses or Lectures offered to the Industry:

1. Hindustan Aeronautics Limited (HAL), Bangalore – Spring-2006, Autumn-2006, Spring-2007, Autumn-2007
2. Hindustan Zinc Limited, Udaipur – Autumn 2005
3. Tata Steel and Tata Motors, Jamshedpur – April, May, 2005 and September 2006

15. Professional/Administrative Service to other Institutions:

1. Editorial Board Member, Lasers in Engineering, Old City Publishing Co, USA (2010-present).
2. Editorial Board Member, High Temperature Materials and Processes, Publisher: DeGruyter, Germany www.degruyter.com/page/flavor (2009-present).
3. Appointed DAAD Honorary Adviser for Indian students willing to carry out higher studies in Germany (appointed by German Academic Exchange Service) 2006-2009.
4. Served as a member of the Advisory Committee of international conferences and symposia namely, MATS-2008 and ISCS-2008 (organized by Tata Steel in Feb. 2008), ICMAT-2008 (organized by IGCAR+INAE in Mar. 2008).
5. Appointed a member of the Research Council (highest administrative and advisory body) of National Metallurgical Laboratory (NML), Jamshedpur (a CSIR unit).
6. Served as an expert for faculty/scientist selection in National Institute of Foundry and Forge Technology (NIFFT), Ranchi; National Metallurgical Laboratory (NML), Jamshedpur; and National Institute of Technology (NIT), Durgapur.
7. Served in the National Organizing Committee of the Annual Technical Meeting of the Indian Institute of Metals in 2005 (Chennai), 2006 (Jamshedpur) and 2007 (Mumbai).
8. Serving in the Editorial Board of STEEL TECH, a bi-monthly bulletin on Steel published by Tata Steel.
9. Served as a member of the Program Advisory Committee of NANO 2006 (An International Conference in Bangalore in Aug. 2006).
10. Served as Guest Editor of a special issue of the Transactions of the Indian Insttute of Metals on NanoScience and Technology [Vol. 58(6), 2005].

11. Deputy Managing Editor of Metal News, a bi-monthly bulletin of the Indian Institute of Metals, Kolkata from August 2005 onwards.
12. Serving the National Council of the Indian institute of Metals since 2004 and maintaining the IIM web site (www.iim-india.net)
13. Serving as a member of the Board of Editors for the International Scientific Journal Computers, Materials and Continua, published by Tech Science Press international journal (ISSN 1546-2218), California, USA.
14. Coordinator, Session on Nanotechnology, MEMS-NANO – An International Conference at the IIT-Kharagpur in Dec 2005.
15. Member, Advisory Committee, ICAMMP 2006 (International Conference on Advanced Materials and Materials Processing), IIT Kharagpur, Feb 2006.
16. Member, National Organizing Committee, National Laser Symposium, Indian Laser Association, IIT-Kharagpur, December 22-24, 2003.
17. Member, Curriculum Revision Committee on Materials Engineering, Indian National Engineering Academy (INAE), 2003.
18. Referee, Acta/Scripta Mater. (Elsevier Science); J. Appl. Phys. (Amer. Inst. of Phy.), Appl. Surface Science (Elsevier), Metall. & Mater. Trans. (ASM, USA), Philos. Mag. (Gordon & Breach), J. Mater. Research (MRS).
19. Referee, Bulletin of Materials Science, published by Indian Academy Of Sciences, Bangalore.
20. Expert, SRF & RA Selection Committee and Project Review Expert of CSIR.
21. Expert, Young Scientist Selection and Project Evaluation of the CSIR.
22. Paper Setter & Examiner - B.E. College (Cal. Univ.).
23. Paper Setter & Examiner - Indian Inst. of Metals, AMIIM Examination.
24. Examiner - Inst. of Engineers (India), AMIE (I) Examn.
25. Examiner - Graduate Aptitude Test (GATE), IIT-Kharagpur.
26. Examiner - Joint Entrance Examination (JEE), IIT-Kharagpur.
27. Examiner - confidential work related to GATE and JEE at the IIT-Kharagpur.
28. Examiner – PhD, MS, BS thesis – I.I.Sc., Bangalore, B.E. College (Cal. Univ.).
29. Consultant, Consultancy project from Century Extrusions Ltd., Nimpura, Kharagpur.
30. Principal Consultant, EPCOS Ferrites Ltd, Kolkata.

16. Membership of Academic/Professional Bodies:

1. Fellow, Electron Microscopy Society of India (EMSI), Kolkata
2. Fellow, Indian National Science Academy (INSA), New Delhi
3. Fellow, West Bengal Academy of Science & Technology (WAST), Kolkata
4. Fellow, Indian Academy of Sciences (IAS), Bangalore
5. Fellow, The National Academy of Sciences, India (NASI), Allahabad
6. Fellow, Indian National Academy of Engineering (INAE), New Delhi
7. Fellow, Institution of Engineers (India), Kolkata
8. Life Fellow, Indian Institute of Metals, Kolkata
9. Member, National Academy of Sciences, Allahabad, India
10. Life Member, Indian Institute of Metals (I.I.M.), India.
11. Life Member, Materials Research Society in India (MRSI), India.
12. Life Member, Indian Laser Association (ILA), India.
13. Life Member, Indian Science Congress Association (ISCA), India.
14. Life Member, Plasma Science Society of India (PSSI), PRL, Ahmedabad.
15. Life Member, Texture Society of India (TSI), DMRL, Hyderabad.

16. Member, Materials Advantage [American Society of Metals (ASM), The Materials Society (TMS), The Association for Iron & Steel Technology (AIST) and the American Iron and Steel Institute (AISI)] USA

17. Academic Visits to University/Institute/Laboratory:

1. Univ. of Saarbruecken, Germany (Prof. H. Gleiter) Feb.'90.
2. Univ. of Bochum, Germany (Prof. E. Hornbogen), Feb.'90.
3. Univ. of Munster, Germany (Prof. Chr. Herzig), Feb.'90.
4. National Metallurgical Lab., Jamshedpur, India (Prof. O. N. Mohanty), Jul.'90.
5. Ind. Inst. of Science., Metall. Dept., Bangalore, (Prof. K. Chattopadhyay), Mar.'91
6. Regional Research Lab., Bhubaneshwar, India (Prof. H. S. Ray), Sept.'91.
7. Mass. Inst. of Tech. (MIT), USA (Prof. Morris Cohen), Dec.'91.
8. Harvard University, USA (Prof. D. Turnbull), Dec.'91.
9. Defence Metall. Research Lab., Hyderabad, India (Dr. C. R. Chakraborti), Oct.'92.
10. Centre for Advanced Technology, Indore, India (Dr. A. K. Nath), Oct.'92.
11. National Chemical Metallurgical Lab., Bombay, India (Dr. D.K. Biswas), Mar.'94.
12. University of Sheffield, UK (Profs. H. A. Davies, H. Jones), May'95.
13. Imperial College, London, UK (Profs. D. R. F. West, H. M.Flower), May'95.
14. Univ. of Cambridge, UK (Dr. H. Bhadeshia, Dr. C. L. Clyne), May'95 and Jun.'98.
15. The Welding Institute, Abbington, UK (Dr. P. Hilton), May'95.
16. National Physical Laboratoy, Teddington, UK (Dr. S. R. J. Saunders), May,95.
17. University of Manchester, UK (Profs. G. W. Lorimer, F. J. Humpreys, Drs. N. Ridley, R. Elliot, R. I. Todd), Jun.'95 and Jun.'98.
18. University of Leeds, UK (Prof. D. V. Edmonds, Dr. R. F. Cockrane), Jun.'95.
19. University of Birmingham, UK (Prof. T. Bell), Jun.'95.
20. Fraunhofer Inst. f. Lasertechnik, Aachen, Germany (Dr. A. Gasser and Dr. A. Weisheit), Dec.'95 and Dec.'99.
21. Technische Universitaet, Clausthal, Germany (Prof. Dr. B. L. Mordike), Dec.'95, May'97, Jun.'98, Dec.'99, May'00.
22. Technische Universitaet, Berlin, Germany (Prof. Dr. H. J. Fecht), Dec.'95.
23. RWTH, Aachen, Germany (Prof. Dr. G. Gottstein), Dec.'99.
24. IFSW, Univ. Stuttgart, Germany (Dr. F. Dausinger), Dec.'99.
25. Wright State Univ., Dayton, USA (Prof. S. Mukhopadhyay), Mar.'00.
26. ARL, Penn. State Univ., USA (Dr. P. Martukanitz), Mar. '00.
27. UTSI, Univ. of Tennessee, USA (Prof. N. B. Dahotre), Mar. '00.
28. IFW, Dresden, Germany (Prof. Dr. L. Schultz), May '00.
29. IWW, TU-Clausthal, Germany (Prof. Dr. Y. Estrin), Dec.'01
30. IIT-Technion, Haifa, Israel (Prof. E. Rabkin), Mar.'02.
31. Unipress (Polish Academy of Sciences), Warsaw (Prof. W. Lojkowski), Apr.'02.
32. Warsaw University of Technology, Warsaw, Poland (Prof. T. Kulik), Apr.'02.
33. Inst. of Metallurgy & Mater. Sci. (IMIM), Polish Academy of Sciences, Krakow, Poland (Profs. J. Dutkiewicz, P. Zieba), Apr.'02.
34. Mech. & Manufac. Engg. Dept., UMIST, Manchester, U.K. (Prof. Lin Li), May '02.
35. Department of Engineering, University of Liverpool, UK (Prof. D. Bacon), May'02.
36. Mater. Sci. Division, Argonne National Lab., USA (Dr. J. A. Eastman), June'02.
37. Mater. Sci. Engg. Dept., Ohio State Univ., USA (Prof. M. Mills), June '02.
38. Dept. of Physics, Univ. Delaware, USA (Prof. G. Hadjipanayis), June '02.
39. Institute of Solid State Physics, Chernogolovka, Russia (Prof B Straumal), May '03.
40. Advanced Research Center for Powder Metallurgy (ARC-I), Hyderabad, India (Dr. G. Sundararajan), July '03.
41. Technical University of Clausthal, Clausthal-Zellerfeld (Prof Dr J Estrin), Jun.2004.
42. Technical University of Darmstadt, Germany (Prof Dr J Eckert), Jun.2004

43. Ecole des Mines, Saint Etienne, France (Dr A Fracewicz), Jun.2004.
44. Ecole Nationale de Ingenieur (ENISE), St Etienne, France (Prof I Smurov), Jun.2004.
45. Indian Institute of Science, Bangalore, India (Prof T Abhinandanan), Aug. 2004.
46. India Science Center, General Motors, Bangalore, India (Dr A Tewari), Aug. 2004.
47. Defense Metallurgical Research Lab., Hyderabad (Dr A Sriramamurty), Apr. 2005.
48. Indira Gandhi Center for Atomic Research, Kalpakkam (Dr S L Mannan), May 2005.
49. University of Central Florida, Orlando, Florida, USA (Prof S Seal), June 2005.
50. University of British Columbia, Vancouver, Canada (Prof M Wells), July 2005
51. University of Chile, Santiago, Chile (Prof R Leteier), June 2006
52. University of Trinidad and Tobago, Port of Spain (Prof K D Srivastava) Aug. 2006
53. High Pressure Research Institute, Warsaw, Poland (Prof W Lojkowski), Aug. 2006
54. National Inst of Foundry Forge Tech, Ranchi, India (Prof M K Banerjee), Sept 2006
55. Sociedade Portuguesa da Inovação (SPI), Porto, Portugal (Dr Rachel Newton), Sept 14-15, 2006 (under Euro-Net project on Nanotechnology).
56. Federal University of Rio Grande do Sul (UFRGS) (Nov 6), National Inst. Of Metrology, Standardization, and Industrial Quality (INMETRO) (Nov 7), CENPES/Petrobrás (Industry) and Min. of Development, Industry and Foreign Trade (UFRJ) (Nov 8), Instrumentation Center for Agriculture (EMBRAPA) and Institute of Chemistry and Physics, State University of Campinas (UNICAMP) (Nov 9), Synchrotron Center (LNLS), Campinas (Nov 10) (Host: J A Brum, I Hümmelgen and S Guterres, under the India-Brazil-South Africa Joint Program) on Nov 5-11, 2006.
57. Inst. For Plasma Research (IPR), Gandhinagar (Dr S Mukherjee), Nov 24, 2006
58. Georgia Technological Univ, Atlanta, USA (Prof WO Winer, Y Joshi), Mar 26'2007
59. Wright State University, Dayton, USA (Prof S Mukhopadhyay), Mar 28, 2007
60. Colorado School of Mines, Golden, USA (Prof B Mishra), Mar 29, 2007.
61. Inst. for Mater. Res., GKSS, Geesthacht, Germany (Prof K U Kainer), Jun 15, 2007.
62. Unipress - High Pressure Research Institute, Warsaw, Poland (Prof W Lojkowski) Sept. 2007.
63. Dept of Materials, Univ. of Queensland, Australia (Prof G Schaffer) and Dept of Materials Engineering, Monash University, Australia (Prof Y Estrin), Oct. 2-6, 2007.
64. Ithemba Laboratory (Cape Town), Silver Lakes (Pretoria), NECSA and Mintek (CSIR), Johannesburg and KwaMaritane, South Africa (N Coville, T Hille, N Marule) Nov 18-25, 2007 (under India-Brazil-South Africa – IBSA tripartite collaboration on Nanotechnology).
65. University of Witwatersrand, Johannesburg, South Africa (N. Coville, B Tait) Aug 25-30'08.
66. CSIR Nanotechnology Laaboratory, Pretoria, South Africa (S Sinharay) Agug. 27,2008.
67. Helmholz Centre Berlin for Materials and Energy (Hahn Meitner Institut), Germany (J Banhart, G Schumacher) Jan 23, 2009.
68. Tokyo Institute of Technology (Yokohama Campus), Japan (M Kajihara), 19 June 2009
69. WPI, Tohuku University, Sendai, Japan (A Inoue, D Louzguine) 23 June 2009 ; and IMRAM, Tohuku University, Sendai (H Fukuyama) 16 June 2009
70. NIMS, Tsukuba, Japan (K Hono) June 2009

18. Invited Talks/Lectures (national/international):

1. 'Evolution of Microstructure in Engineering Materials', Aero Society India**, RCI, Hyderabad,** 22.01.2017
2. 'Materials: An Interface between Society and Science', 3rd Indo-Austrian Symposium on Advances in Materials Engineering, **IIT Bombay**, 19.12.2016

3. ‘Discontinuous Precipitation- A Model Moving Boundary Phase Transformation’, ICAMMP IV, **IIT Kharagpur**, 06.11.2016
4. ‘Materials: An Interface between Society and Science’, **CV Sundaram Memorial Lecture, IIM Mumbai Chapter, IIT Bombay**, 24.09.2016
5. ‘Materials Engineering: An Interface between Society and Science’, **Prof. Brahm Prakash Memorial Lecture, IISc Bangalore**, 21.08.2016
6. ‘Evolution of Microstructure in Engineering Materials’, MCPP, **IIEST Shibpur**, 29.07.2016
7. ‘Size Dependent Polymorphic Change in Early Transition Metals Induced by Mechanical Attrition/Milling’, **ICMR 2016, IISc Bangalore**, 20.06.2016
8. ‘Novelty of Nano-Dispersed Solid Alloys and Thermal Fluids’, **NMNC 2016, KIIT Bhubaneswar**, 29.01.2016
9. ‘Materials Science Engineering and Technology’, Saint Gobain 350, Research Park, **IIT Madras**, Chennai, 28.01.2016
10. ‘Development and Characterization of New Age Hardenable Amorphous Matrix Al-Alloys Synthesized by Mechanical Alloying’, Advances in Light Metals and its Composites, **SRM University, Chennai**, 06.12.2014
11. ‘Tailoring of Microstructure and Properties for Materials Development’, International Conference on Emerging Materials: Characterization and Applications, **CSIR-CGRI Kolkata**, 04.12.2014
12. ‘Development and Characterization of New Age Hardenable Amorphous Matrix Al-Alloys Synthesized by Mechanical Alloying’, **TWAS 2013 Prize Ceremony and 25th General Meeting, Muscat, Oman,** 26.010.2014
13. ‘Materials Engineering: An Interface between Society and Science’, **Prof Brahm Prakash Memorial Lecture, IGCAR Kalpakkam,** 19.09.204
14. ‘Nanometric Phase Dispersed Metal Matrix Composites- A New Class of Age Hardenable Amorphous Al-Alloy’, **Leopoldina-INSA Symposium on Nanosciences, Halle,** 25.11.2013
15. ‘Materials Science and Engineering: An Interface between Society and Technology’, **Placid Rodriguez Memorial Lecture, IGCAR Kalpakkam**, 05.10.2013
16. ‘Materials Engineering Challenges Concerning High Temperature Materials and Structures for Space Applications’ Brahm Prakash Birth Centenary Workshop, High Temperature Materials and Hot Structures, **ISRO-IIM Trivandrum Chapter, Trivandrum**, Kerala, 13.05.2013
17. Lectures on ‘I. Physical Metallurgy of Steel II. Corrosion of Steel’, **AcSIR Program of CSIR-CBRI, Roorkee**, 26.04.2013
18. ‘Novelty of Thermophysical Properties of Nano-Metallic/Ceramic Dispersed Water/E-Glycol Based Nanofluids’, **India-Singapore Workshop on Advanced Materials and Energy, IACS Kolkata,** 22.04.2013

19. 'Novelty of Steel: Microstructure and Property Correlation in Bainite+Martensite Steel', **Annual General Meeting of IIM Kanpur Chapter, IIT Kanpur**, 12.04.2013
20. 'In Pursuit of Excellence' **Research Scholars' Day, IIT Madras**, 25.03.2013
21. 'Novelty of Thermophysical Properties of Nano-Metallic/Ceramic Dispersed Water/E-Glycol Based Nanofluids', Aluminas 2013, **CSIR-CGCRI Kolkata**, 07.03.2013
22. 'Novelty of Steel:Microstructure and Property Correlation in Bainite + Martensite Steel', International Conference on Advanced Materials for Energy Efficient Buildings, **CSIR-CBRI, Roorkee**, IHC, New Delhi, 14.02.2013
23. 'Materials Design by Tailoring the Microstructure Through Thermodynamic Modeling and Experimental Simulation', International workshop on Computational Materials Design and Engineering, **IIT Jodhpur**, 08.02.2013
24. 'Novelty of Thermophysical Properties of Nano-Metallic/Ceramic Dispersed Water/E-Glycol Based Nanofluids', **AMPC 2013, Anna University**, Chennai, 06.02.2013
25. 'Development of Bioceramic Prosthesis and Implants at CSIR-CGCRI, Kolkata, **BIND-12, IISc**, 09.12.2013

19. Extra-curricular activities:

1. **Captained Nadia District Junior cricket team** in 1977-79.
2. **Captained B.E. College cricket team** in 1982-83.
3. **Represented I.I.T. Kanpur in Inter-IIT sports Meet** (cricket & volleyball) in1984.
4. **Participated** in several All India Radio (Calcutta) **Science Quiz Programmes**.
5. **Represented I.I.T. Kharagpur (cricket) at the Inter-IIT Staff Meet** in 1986-87.
6. **Member, Executive Council, Global Alumni Association of BESU**, Howrah, (2009-2011).

20. Major Initiatives at IIT Kanpur during 7th Nov2012 to 6th Nov2017

[A] ACADEMIC:

1. New Academic Units established: **Earth Science** (*Department*)**; Economic Sciences** (*Department*)**; Cognitive Sciences** (*Inter-Disciplinary Program*)
2. Program: Introduced a new **Master of Science** (By Research) program; and a **new Joint PhD program** with NUS Singapore, Univ of Melbourne (six more to follow)
3. Academic interventions: Introduced **Research Scholars' Day** celebration (a new system) in each Department; a new scheme of **Inter-disciplinary project thesis award** to promote inter-disciplinary research culture and collaboration

[B] FACULTY:

1. **Faculty recruitment**: Recruited over 100 new faculty to cross 400+ faculty strength (**for the first time** in IITK history); made > 200 offers after selection in 5 years (all category); held 12-15 selection interviews each year
2. **Peer Review:** Organized an exhaustive **Internal (Department wise) and External (Institute wide)** peer review in 2014 as per IIT Council resolution
3. **Emeritus Professor/Fellow/Scientist:** Creation of guideline/norms through the BoG and its implementation for selection of Emeritus level faculty appointments
4. Streamlining internal **assessment/promotion** of faculty members at all levels

[C] RESEARCH:

1. Establishing a new **National Center for Flexible Electronics (FlexE)** at IITK with a **Rs 133 crore** grant from Ministry of Electronics and Information Technology (largest ever from one single ministry to one single institute)
2. **Research Establishment Engineers** (REO) – new cadre (contractual staff under DORD) through temporary conversion of vacant faculty positions through BoG
3. **IITK-TCS Joint Research Cell** on Integrated Computational Materials Engineering
4. Launching **Technology Development Initiative** (TDI) to showcase and market new technology development possibilities

[D] STUDENTS:

1. Inter IIT and **sports promotion** leading to **General Championship** for IITK first time in the history – 2013, 2014, 2016 (3 years in a row, 2015 was abandoned) for students
2. Launching **Career Development Cell and Orientation Program** for UG students
3. **Faculty Adviser** (in Departments) and **Hall Guardian** (in hostels) system

[E] GOVERNANCE:

1. **Statute revision** (after 20 years) of IIT Kanpur
2. **Vision and Mission** Statement for IITK (never existed until 2017)
3. Introduction of **Institute Foundation Day** (2nd November, registration as a society) celebration (2013 onwards) to award various institute awards
4. Approval and adoption of **Master Plan** of IITK through Open House, IAC and BoG
5. Creation of **a new Deanship for Infrastructure and Planning (DOIP)** and **12 new Associate Deanships** to assist each Dean including one for International Relations
6. Creation and introduction of **a new staff promotion policy** for non teaching and administrative staff (through internal consultation and BOG approval).
7. Instituting an ambitious **Institute Automation Project: PINGALA** (to bring all faculty affairs, leave, salary, projects, purchase, student affairs under automation)
8. Launching **new IIT Kanpur website** in 2014
9. Creation of **Information Cell** for news-content creation and regular dissemination
10. Creation of **Safety Cell** and appointing a **Safety Officer** to ensure safety norms
11. New **group health insurance scheme** for employees, retirees and students
12. **Health Center review and reforms**: In house pharmacy counter, Specialist doctor visits, two new ambulances, Dental/Physiotherapy/Eye/Orthopedic check up, etc

[F] INFRASTRUCTURE:

1. Creating and appointing **Green Cell** and **Environment Advisory Committee** to address and monitor all concerns and agenda related to campus environment and maintenance
2. Promoting **entrepreneurship** through formation of a **Section 8** (not-for-profit) company under SIDBI Innovation and Incubation Center at IITK (through BoG)
3. Constructing about **200 new flats** (Type IV Faculty Apartments), **New Hostel Construction**: Hall XII (A, B), Girls Hostel Tower (Hall VI), Hall XIII, **International Student Hostel** (under construction), **Type II staff apartment**s flats (96 flats), **Research Associate (RA) tower** with about 50 flats, **IITK Outreach Center at NOIDA**, Constructing **three new modern lecture halls** (L 18, L 19, L 20), **Flexible Electronics Center** (new building for the Rs 133 crore project of MEITY), a new **Student Lounge** at the Lecture Hall Complex

[G]NATIONAL Level:

1. **National Coordinator**, IMPacting Research INnovation and Technology (**IMPRINT**)
2. Member for Science and Technology, **SAMAVESH, NITI Aayog**
3. Coordinator for **IIT Council website** – a web organ to provide all IIT system

[J] PERSONAL:

1. **New Course on Surface Engineering** – introduced/taught for the first time at IITK
2. **Honors/awards during 2012-17**: Received **Engineering Prize** and got elected a **Fellow** of **The World Academy of Sciences** (TWAS), Got elected a **Member of Asia-Pacific Academy of Materials** (APAM), Received **DSc (hc)** from **Kazi Nazrul University at Asansol** and **University of Kalyani** (West Bengal), Was awarded the **Distinguished Alumnus Award** by the **IIT Kharagpur** and **IIEST Shibpur** (formerly B E College)