

KUMKUM BANERJEE

Phone (O): +91-824-247-3757

E-Mail: kumkum@nitk.edu.in; kumkum@nitk.ac.in

RESEARCH INTERESTS

Thermo-mechanical Processing of Metals; Joining of Metals; Materials Characterization; Microstructure-Property Correlation; Corrosion and Hydrogen Embrittlement of Metals; Crystallographic Texture in Metals; Recrystallization and Precipitation Kinetics; Product Development in Steel; Failure analysis; Electropulsing; Additive Manufacturing

SKILLS

- Hands-on experience in using **EG & G PARC & PS6 potentiostats**
(for corrosion rate measurement)
- Hands-on experience in handling **Instron tensile testing equipment**
(for tensile properties of materials)
- Hands-on experience in using **CORTEST slow strain rate testing (SSRT) machine**
(for hydrogen embrittlement studies)
- Hands-on experience in using **XRD and X-ray texture goniometer**
- Hands-on experience in using optical microscope, **SEM including FEG-SEM-EDS-EBSD, TEM-EDS and STEM-EDS**
(for materials characterization)
- Hands-on experience in handling **Gleeble 1500 and Gleeble 3500 thermomechanical simulators**
(for thermomechanical simulation studies)
- **Research, teaching, reviewing and editorial expertise**
- Experience with Windows operating system, such as, Windows 95/98/NT/XP and Microsoft office, such as Word/Excel/PowerPoint and ability to handle different software
- Experience in specialized software such as those applicable for **EG & G and PS6 systems for corrosion studies, texture goniometry, XRD, image analysis, SEM-EDS-EBSD, TEM-EDS, Gleeble 1500 and 3500, Thermo-Calc**, etc.

EDUCATION

- 1999 PhD Degree in Metallurgical Engineering from Indian Institute of Technology (IIT), Kharagpur, India
Title of Thesis: Hydrogen Embrittlement of HSLA-80 and HSLA-100 Steels in Seawater under Cathodic Charging Conditions
- 1994 BSc Engineering Degree (Metallurgical) from Birsa Institute of Technology (BIT), Sindri, Dhanbad, [Vinoba Bhave University, Hazaribagh], India
Title of Thesis: A Review on Composite Materials
- 1988 BSc Degree (Physics-Chemistry-Math) from Shri Shri Lakshmi Narayan Trust (SSLNT) Women's College, Dhanbad, [Ranchi University, Ranchi], India

➤ 1995 GATE (Graduate Aptitude Test in Engineering) Qualified

Linguistic Abilities: English, Hindi and Bengali

POST-DOCTORAL RESEARCH EXPERIENCE

- Research Associate at the Department of Materials Science and Engineering, **Carnegie Mellon University, Pittsburgh, Pennsylvania, USA**, in the year 2000-2001
- Post-Doctoral Fellow at the Department of Mechanical and Industrial Engineering, **University of Manitoba, Winnipeg, Manitoba, Canada** in the year 2002-2004
- Research Associate at the Department of Materials Engineering, **The University of British Columbia, Vancouver, British Columbia, Canada** in the year 2008-2009 (*on study leave from Tata Steel Ltd, Jamshedpur, India*)

WORK EXPERIENCE

| | | |
|--|---|---|
| 10 Aug 2015-to date | Dept. of Metallurgical & Materials Engineering National Institute of Technology Karnataka (NITK) Surathkal, Mangalore, Karnataka, India | Associate Professor |
| 2 Aug 2004- 4 Aug 2015 | Research and Development Division Tata Steel Limited (TSL) Jamshedpur, Jharkhand, India | Principal Researcher & Project Leader |
| 1 April 2008-28 Feb 2009 (<i>On study leave from Tata Steel Limited Jamshedpur</i>) | Dept. of Materials Engineering The University of British Columbia (UBC) Vancouver, British Columbia, Canada | Post-Doctoral Research Associate (In a sponsored project—"Development of HAZ microstructure models of high strength line pipe steels") |
| 2 May 2002-31 Mar 2004 | Dept. of Mechanical & Industrial Engineering University of Manitoba (UofM) Winnipeg, Manitoba, Canada | Post-Doctoral Fellow (In a sponsored project---"Weldability assessment and improvement of Ni-based superalloys") |
| 17 Jan 2002-24 April 2002 | Dept. of Metallurgical & Materials Engineering Indian Institute of Technology (IIT) Kharagpur, India | Project Consultant (In a BRNS-sponsored project—"Stress corrosion cracking of Hastelloy 'C' in fluoride environment") |
| 10 Jan 2001-9 Jan 2002 | Corrosion Protection Division National Metallurgical Laboratory (NML-CSIR Lab) Jamshedpur, India | Scientist |
| 1 Aug 2000-2 Jan 2001 | Dept. of Materials Science & Engineering Carnegie Mellon University Pittsburgh, Pennsylvania, USA | Post-Doctoral Research Associate (In a sponsored project- "Microstructure, mechanical properties and texture of strip cast low 'C' steel sheets") |
| 1 Feb 2000-23 July 2000 | Dept. of Construction, Materials Engineering and Industrial Design, Western Michigan University Kalamazoo, Michigan, USA | Assistant Professor |

| | | |
|-------------------------|--|---|
| 3 Dec 1999-25 Jan 2000 | Dept. of Metallurgical & Materials Eng. Indian Institute of Technology (IIT) Kharagpur, India | Post-Doctoral Research Associate (In an Indo-US project- “Corrosion characteristics of advanced ferrous alloys” in collaboration with Naval Research Laboratory (NRL), Washington, DC, USA) |
| 23 Nov 1995-2 Dec 1999 | Dept. of Metallurgical & Materials Eng. Indian Institute of Technology (IIT) Kharagpur, India | Research Fellow (Ph.D. Candidate) (In an Indo-US project--“Corrosion characteristic of advanced ferrous alloys” in collaboration with Naval Research Laboratory (NRL), Washington, DC, USA) |
| 1 June 1995-31 Oct 1995 | Dept. of Fuel & Mineral Engineering Indian Institute of Technology [IIT (ISM)] (Indian School of Mines) Dhanbad, India | Junior Research Fellow (In a sponsored project--“Modelling and scale-up studies of water only cyclone treating coal”) |

SPONSORED PROJECT

Young Scientist’s Project – “Mechanical and Corrosion Characteristics of Al-Ni and Al-Fe-Ce alloys”, while working at NML Jamshedpur in **2002**, funded by **Department of Science and Technology (DST), Govt. of India (GOI)**

SUPERVISION/MENTORING & COACHING

- Mentored and trained Research Associates, Interns, Junior Researchers, and Supervisors of the R&D Dept. of Tata Steel Limited, Jamshedpur, India
- **PhD external thesis examiner** [BITS Pilani, 2013, IIT (ISM) Dhanbad, 2017 and Univ. of Hyderabad, 2021]
- MTech Thesis Supervised – “Ageing and Recrystallization Behaviour of IF-Cu-steel” of IIT Kharagpur, India [Co-Supervisor, Student Name: Mr. Shambhu Sharan Patel, 2006]
- Coaching, mentoring and supervising BTech, MTech and PhD students of Dept of Metallurgical & Materials Engineering, NITK Surathkal, Mangalore, Karnataka, India, since Aug 2015

ACADEMIC COURSES HANDLED

Powder Metallurgy and Joining of Metals (Undergrad theory course), Advanced Welding Technology (Undergrad theory course), Joining of Metals (Undergraduate theory course), Steels and their Heat Treatment (Graduate theory course), Physical Metallurgy (Undergrad theory course), Physical Metallurgy (Undergrad lab course), Metallography (Undergrad lab course), Corrosion Science and Engineering (Graduate theory course), Materials Engineering (Graduate lab course) and Corrosion Science and Engineering (Graduate lab course)

RESEARCH PROJECTS HANDLED

University/Research Lab/ Post-doctoral Projects (*selected major projects*)

- ✓ Modelling and scale-up studies of water-only cyclone treating coal.
---[Indian Institute of Technology \(Indian School of Mines\), Dhanbad, India](#)
- ✓ Hydrogen embrittle of HSLA-80 and HSLA-100 steels in seawater under cathodic charging conditions (Ph.D. work)
---[Indian Institute of Technology, Kharagpur, India](#)
- ✓ Microstructure, mechanical properties and texture of strip cast Low C steel sheets (Post-Doctoral research Work)
—[Carnegie Mellon University, Pittsburgh, USA](#)
 - The work was supported by the renowned steel industries (AKV, SMS, LTV, Dofasco, US-Steel, etc) in North America, and the steel, first of its kind, was supplied by Broken Hill Proprietary (*now BlueScope*), Australia.
 - This study helped render knowledge about microstructure, texture, and recrystallization kinetics in the steel in various non-conventional novel processing conditions that subsequently helped select suitable operating conditions for obtaining favourable microstructure and texture to generate desired mechanical properties
 - The optimized processing parameters were implemented duly.
 - The work was published in 'Iron and Steelmaker' in 2003 and presented at an international conference.
- ✓ Weldability improvement in Ni-Based superalloys (Post-Doctoral research Work)
---[University of Manitoba, Winnipeg, Canada](#)
 - The project was sponsored by NSERC, Canada and was in collaboration with Bristol Aerospace Limited, Canada.
 - Weldability of the alloys was improved and the same was subsequently implemented.
 - A part of the work was presented at the 15th Canadian Materials Science Conference, Nova Scotia, Canada, held in June 2003, and the full work was published in the 'Metallurgical and Materials Transactions A', 2005.
 - A review article on the effect of magnesium on superalloys was published in Materials Sciences and Applications in 2011.
- ✓ Development of HAZ microstructure models for high strength line pipe steels (*Research work during study leave from Tata Steel*)
--- [The University of British Columbia, Canada](#)
 - The project had partners from the leading Canadian manufacturer of line pipe, EVRAZ (formerly IPSCO) and the builder and operator of major Canadian pipelines (TransCanada), and the leading supplier of pipeline welding equipment (CRC-Evans).
 - The work had been published in the 'Metallurgical & Materials Transactions A', 2010, 'Solid State Phenomena', 2011 and 'Materials Science Forum', 2012.
 - A patent was filed for a part of the work (Application No. 172/KOL/2010 dated 23 Feb 2010).
The work was also published in 2-international conference proceedings and presented at 2-international conferences and 1-national conference.

---National Metallurgical Laboratory (CSIR Laboratory), Jamshedpur, India

- ✓ Corrosion behaviour of low carbon strip cast steels
- ✓ Mechanical and Corrosion Characteristics of Al-Ni and Al-Fe-Ce alloys (Young Scientist's Project awarded by DST, GOI, India)

Major (*selected*) Research Projects Completed at Tata Steel Limited, Jamshedpur, India

- ✓ Texture evaluation of CRCA, IF, IF-HS and EDD grade steels
- ✓ Development of IF steel for critical applications
- ✓ Improvement of formability in Interstitial Free High Strength (IF-HS) Steel
- ✓ Reduction in mill load of HSM Stand (1, 2 & 3) for TMBP-2
- ✓ Development of high carbon graphitic steels with enhanced drawability
- ✓ Development of advanced high strength steels (AHSS) with superior weldability aiming plug type nugget of diameter $<6\sqrt{t}$
- ✓ Development of X-70 linepipe steel through TSCR for non-sour environment
- ✓ Optimisation of microstructure of TFF tubes for eliminating the defects during processing
- ✓ Designing of microstructure in medium/high carbon steels for superior properties using electropulsing
- ✓ Improving tensile properties of low-carbon steels by rapid annealing technique

Research Projects Guided: At NIT Karnataka, Surathkal, Mangalore, Karnataka, India (*current institute*)

- ✓ Year 2016-17 (MTech Thesis Project, NITK Surathkal—in collaboration with DMRL, Hyderabad)
Project Title: Mechanical property and Microstructural correlations of gamma-TiAl alloys
Student: Mr Abheepsit Raturi, NITK Surathkal
- ✓ Year 2016-17 (MTech Thesis Project, NITK, Surathkal—in collaboration with DMRL, Hyderabad)
Project Title: Internal friction: Approaches and some application in material characterization
Student: Mr Sooraj S Rao, NITK, Surathkal
- ✓ Year 2016-17 (MTech Thesis Project, NITK, Surathkal—in collaboration with IGCAR, Kalpakkam, India)
Project Title: Corrosion studies on thermally treated commercially pure titanium
Student: Mr Mallikharjuna Reddy, NITK, Surathkal
- ✓ Year 2018-19 (MTech Thesis Project, NITK, Surathkal—in collaboration with Tata Steel, Jamshedpur, India)
Project Title: Understanding the influence of build strategy on microstructure and mechanical properties of additively manufactured SS316L by laser metal deposition
Student: Mr Sreeram Dingari, NITK, Surathkal

- ✓ Year 2018-19 (MTech Thesis Project, NITK, Surathkal—in collaboration with DMRL, Hyderabad, India)
Project Title: Laser Shock Peening (LSP) on Pure Aluminium—Simulation Studies
Student: Mr Chinmai Bhat, NITK, Surathkal
- ✓ Year 2018-19 (MTech Thesis Project, NITK, Surathkal—in collaboration with GE, Bangalore, India)
Project Title: Comparative study on cast versus additively manufactured nickel-based superalloys
Student: Mr Ananthkrishnan Ullas, NITK, Surathkal
- ✓ Year 2019-20 (MTech Thesis Project, NITK, Surathkal—in collaboration with DMRL, Hyderabad, India)
Project Title: Effect of heat treatment on microstructure and properties of a high strength low alloy steel
Student: Mr. Sreerag M, NITK, Surathkal
- ✓ Year 2019-20 (MTech Thesis Project, NITK, Surathkal—in collaboration with DMRL, Hyderabad, India)
Project Title: Evaluation of Plain strain compression behavior of high strength low alloy steels using Gleeble thermomechanical simulator
Student: Mr Karthik V Venkitesh, NITK, Surathkal
- ✓ Year 2019-20 (MTech Thesis Project, NITK, Surathkal—in collaboration with JSW, Bellary, India)
Project Title: Study of rapid transformation annealing in steels
Student: Mr Karthik Shinde, NITK, Surathkal
- ✓ Year 2020-21 (MTech Thesis Project, NITK, Surathkal)
Project Title: Joining of dissimilar aluminium alloys with steels using gas metal arc welding and gas tungsten arc welding
Student: Mr Gaurav Singh, NITK, Surathkal
- ✓ Year 2020-21 (MTech Thesis Project, NITK, Surathkal)
Project Title: Recrystallisation kinetics and micro texture of low carbon strip cast steel
Student: Mr Dibin Dinesh K, NITK, Surathkal
- ✓ Year 2020-21 (MTech Thesis Project, NITK, Surathkal)
Project Title: Fusion welding of austenitic stainless steel with ferritic stainless steel using GTAW and GMAW processes
Student: Mr Tanmoy Sur Choudhury, NITK, Surathkal

- ✓ Year 2021-22 (MTech Thesis Project, NITK, Surathkal)
Project Title: Recrystallization and texture of microalloyed steels
Student: Mr Devender Sharma, NITK, Surathkal

- ✓ Year 2021-22 (MTech Thesis Project, NITK, Surathkal)
Project Title: Microstructure and texture of advanced high strength steels
Student: Mr Rahul K R, NITK, Surathkal

- ✓ Year 2021-22 (MTech Thesis Project, NITK, Surathkal-In collaboration with ARCI, Hyderabad, India)
Project Title: Laser welding of Fe-based superalloys
Student: Mr Hitesh Kumar, NITK, Surathkal

- ✓ Year 2021-22 (MTech Thesis Project, NITK, Surathkal-Discontinued by student to join job)
Project Title: Laser welding of aluminium alloys with steel
Student: Mr Ravi Teja Nagireddy, NITK, Surathkal

- ✓ Year 2021-22 (MTech Thesis Project, NITK, Surathkal)
Project Title: Friction stir welding of aluminium alloys with steel
Student: Mr Manish Dubey, NITK, Surathkal

- ✓ Year 2022-23 (Ongoing MTech Thesis Project, NITK, Surathkal—in collaboration with ISRO, Mahendragiri, TN, India)
Project Title: Electron beam welding and gas tungsten arc welding of IN-718 superalloy
Student: Mr Manish Tripathy, NITK, Surathkal

- ✓ Year 2022-23 (Ongoing MTech Thesis Project, NITK, Surathkal)
Project Title: Hydrogen embrittlement of IN-718 weldments
Student: Mr Yogesh Mahawar, NITK, Surathkal

- ✓ Year 2022-23 (Ongoing MTech Thesis Project, NITK, Surathkal)
Project Title: Microstructure and mechanical properties of cold-rolled and annealed AHSS
Student: Mr Predeep D, NITK, Surathkal

- ✓ Year 2022-23 (Ongoing MTech Thesis Project, NITK, Surathkal)
Project Title: Structure-property correlation of HSLA and AHSS grades
Student: Mr Shubhank Shivhare, NITK, Surathkal

- ✓ Year 2016-17 (BTech Major Project, NITK, Surathkal, India)
Project Title: Fabrication and characterization of aluminium–silicon carbide metal matrix composite
Students: Mr Ajey S Hegde & Ms Aishwarya S K
- ✓ Year 2016-17 (BTech Major Project, NITK, Surathkal)
Project Title: Metallographic inspection of bicycle parts
Students: Ms Amal Mansoor & Mr Chandra B Harsha
- ✓ Year 2017-18 (BTech Major project, NITK, Surathkal)
Project Title: Ageing behaviour of AA-6061 aluminium alloy
Students: Mr Arjun B & Mr Tirumala Prasad
- ✓ Year 2017-18 (BTech major project)
Project Title: Spheroidization of cementite in high carbon steel wires
Students: Ms. Prathvi B K & Mr Sravan Kumar
- ✓ Year 2018-19 (BTech major project)
Project Title: Microstructure and mechanical properties of microalloyed Advanced High strength steel
Students: Mr Akash Benagi & Mr Vinodraj S Madari
- ✓ Year 2018-19 (BTech major project)
Project Title: Tempering of plain carbon and microalloyed high strength steels
Students: Mr Akhil D. Kumar & Mr Avinash Anand
- ✓ Year 2019-20 (BTech major project)
Project Title: Behaviour of a high strength steel in various quenching media
Students: Ms Madhumitha B & Ms Shubha U. Gowda
- ✓ Year 2020-21 (BTech major project)
Project Title: Resistance Spot Welding of Advanced High Strength Steels –A Review
Students: Mr M P Vidyadhar & Mr Ninad Lamture
- ✓ Year 2021-22 (Ongoing BTech major project)
Project Title: Mechanical behaviour of heat-treated PH grade stainless steels
Students: Mr Rajasekhar Korada & Mr Akash Kumar

- ✓ Year 2021-22 (Ongoing BTech major project)
Project Title: Recrystallization of Ti alloys
Students: Mr Pradeep Raj & Mr Himanshu Chaudhari
- ✓ Year 2021-22 (Ongoing BTech major project)
Project Title: Recrystallization of Ti alloys
Students: Mr Pradeep Raj & Mr Himanshu Chaudhari
- ✓ Year 2022-23 (Ongoing BTech major project)
Project Title: Tempering of AHSS
Students: Mr Bharath & Mr Kanak
- ✓ Year 2022-23 (Ongoing BTech major project)
Project Title: Microstructural and mechanical characterization of stainless-steel weldments
Students: Mr Sagar & Mr Advik
- ✓ Jan 2016-Nov 2021 (PhD thesis project) (Co-supervisor: Dr K Devakumaran, Manager, BHEL, Trichy)
Project Title: Welding of dissimilar aluminium alloys for automotive applications
candidate: Dr R Rajeshkumar (PhD *Degree awarded on 6 Nov 2021 during 19th convocation*)
- ✓ Jan 2020- Jul 2021 (PhD thesis project-*Discontinued by student due to personal reasons*)
Candidate: Mr Ravi Raj Anand (Thesis topic—Joining of steel with aluminium)
- ✓ Aug 2022-to date (PhD thesis project)
Candidate: Ms Preethi J Aradhya (Thesis topic (broad area)—Joining of alloys)

MTech Research Project guidance (as Co-Supervisor at IIT Kharagpur)

- ✓ Year 2005-06 (MTech Thesis co-supervised with Prof Shiv Brat Singh, IIT Kharagpur, India)
Project Title: Ageing and Recrystallization Behaviour of IF-Cu-steel
Mr Shambhu Sharan Patel (IIT Kharagpur) (as external co-guide, Tata Steel--2006)

SHORT TERM COURSES ORGANIZED

| S. No. | From | To | Name of Course | Coordinator/Organizer | Number of Participants |
|--------|------------|-----------------------|--|---|------------------------|
| 1. | June 2006 | June 2006 (5 days) | Transmission Electron Microscopy--by Prof. (late) D S Sarma, Ex Professor IIT (BHU), India | Coordinator, R&D Dept, Tata Steel Ltd, | 38 |
| 2. | May 2007 | May 2007 (7-days) | Crystallographic Texture--by Prof. A. D. Rollett, CMU, Pittsburgh, USA | Coordinator, R&D Dept, Tata Steel Ltd, | 26 |
| 3. | April 2006 | April 2006 | Ethics at work place | Coordinator and Organizer, R&D Dept, | 83 |
| 4. | Feb 2010 | Feb 2010 (1-day) | Data Acquisition System—by Pyrodynamics, India | Coordinator and Organizer, R&D Dept, Tata Steel Ltd, | 6 |
| 5. | June 2010 | June 2010 (3-days) | X-ray Diffraction ---by Dr. Ravi Kumar, Scientist, NML Jamshedpur, India | Coordinator & Organizer, R&D Dept, Tata Steel Ltd, Jamshedpur | 22 |
| 6. | Feb 2010 | Feb 2010 (1-day) | Identifying and mentoring the speakers and finalizing the presentations of the best R&D projects of Tata Steel and subsequent organizing of the Managing Director's visits to R & D, Tata Steel for assessing the best projects. | R&D Dept, Tata Steel Ltd, Jamshedpur | 25 |

SHORT TERM COURSES ATTENDED

| S. No. | From | To | Institute/Organization | Sponsored by | Name of Course |
|--------|-----------|-----------------------|---|--|--|
| 1. | Mar 2014 | Jan 2014 (9-days) | R&D Dept, Tata Steel Ltd, Jamshedpur, India | R&D Dept., Tata Steel Limited, Jamshedpur, India | Course on Transmission Electron Microscopy—by Prof. N. Prabhu, IIT Bombay |
| 2. | Feb 2014 | Feb 2014 (3-days) | Tata Steel Limited, Jamshedpur, India | Tata Steel Limited, Jamshedpur, India | Advanced training on interpersonal effectiveness (for officers and executives of Tata Steel) |
| 3. | Nov 2013 | Aug 2014 (9-days) | R&D Dept, Tata Steel Ltd, Jamshedpur, India | R&D Dept., Tata Steel Limited, Jamshedpur, India | Advanced Thermodynamics course on ThermoCalc –by Prof. Hari Kumar, IIT Madras |
| 4. | May 2010 | May 2010 (3-days) | Tata Steel Limited, Jamshedpur, India | Tata Steel Limited, Jamshedpur, India | Training on interpersonal effectiveness (for officers/executives of Tata Steel) |
| 5. | Feb 2010 | Feb 2010 (1-day) | R&D Dept, Tata Steel Ltd, Jamshedpur, India | R&D Dept, Tata Steel Ltd, Jamshedpur, India | Training on Data Acquisition System—by Pyrodynamics |
| 6. | June 2010 | June 2010 (3-days) | R&D Dept, Tata Steel Ltd, Jamshedpur, India | R&D Dept, Tata Steel Ltd, Jamshedpur, India | Training on X-ray Diffraction-- by Dr. Ravi Kumar NML Jamshedpur |
| 7. | May 2007 | May 2007 (7-days) | R&D Dept, Tata Steel Ltd, Jamshedpur, India | R&D Dept, Tata Steel Ltd, Jamshedpur, India | Course on Crystallographic Texture -- by Prof. A. D. Rollett, CMU, Pittsburgh, USA |

| | | | | | |
|-----|-----------|-----------------------|--|---|---|
| 8. | Aug 2006 | Aug 2006 (3-days) | Tata Steel Limited, Jamshedpur, India | Tata Steel Limited, Jamshedpur, India | Training on problem solving and decision making (for officers/executives of Tata Steel) |
| 9. | June 2006 | June 2006 (5 days) | R&D Dept, Tata Steel Ltd, Jamshedpur, India | R&D Dept, Tata Steel Ltd, Jamshedpur, India | Course on Transmission Electron Microscopy-- by Prof (late) D S Sarma, Ex Prof. IIT, BHU, India |
| 10. | Feb 2006 | Feb 2006 (4-days) | R&D Dept, Tata Steel Ltd, Jamshedpur, India | R&D Dept, Tata Steel Ltd, Jamshedpur, India | Course on ThermoCalc software course --by Prof. Hari Kumar, IIT Madras |

OTHER RESPONSIBILITIES

- Lab In charge of the Gleeble 1500 thermomechanical simulator in the R & D Dept of Tata Steel, Jamshedpur, India (Sept 2009-Dec 2012)
- **Member of the Editorial Committee of Tata Steel Ltd., Jamshedpur, India**
- **Editor and Coordinator of the Quarterly R & D Highlights of Tata Steel India and Europe (Jan 2010-Apr. 2011).**
- Selection and presentation finalization of Best R&D Projects of Tata Steel and subsequent organizing of the Managing Director's visits to R & D, Tata Steel for presentation of the projects
- Life Member of the Indian Institute of Metals (membership No.: 43531 since year 2009)
- Procurement committee member of Gleeble 3800 thermomechanical simulator in the R & D Dept of Tata Steel, Jamshedpur, India (2014)
- **Corresponding Editor of Metal News, Indian Institute of Metals (2010-17)**
- Chairperson, Transport Committee, for the International Conference, "Make in India: Role of Materials" (Golden Jubilee Celebration of the Dept of Metallurgical & Materials Engineering, National Institute of Technology, Karnataka, Surathkal, India) during 30-31 Oct 2015
- Member of Departmental Under-Graduate Committee, Post Graduate Committee and Research Progress Committee, Dept. of Metallurgical and Materials Engineering, NITK, Surathkal (2015-18)
- Secretary, Departmental Post Graduate Committee, Dept. of Metallurgical and Materials Engineering, NITK, Surathkal (2019), Mangalore, India
- Chairperson of one of the MTech thesis evaluation committees, NITK Surathkal, Mangalore, India (2015-till date)
- Chairperson, Class Committee--BTech VI Semester (2019), NITK Surathkal, Mangalore, India
- Chairperson, Class Committee--MTech III Semester (2019), NITK Surathkal, Mangalore, India
- Lab In charge, Mechanical Testing Lab and Heat Treatment Lab, Metallurgical & Materials Engineering Department, NITK, Surathkal, Mangalore, India
- Member of Anti-Ragging Committee, NITK Surathkal (2015-19), Mangalore, India
- Member of Convocation Committee, NITK Surathkal (2015-2017), Mangalore, India
- Polling Officer, Institute Student Election Committees, NIT Karnataka, Surathkal, Mangalore, India
- **Chairperson, Technical Committee and Chief Editor, Souvenir, for the National Conference on Processing of Materials, NCOPOM'18, held at NIT Karnataka, Surathkal, Mangalore, India, during Sept 2018**

- Coordinator, NBA-Audit 2020, Dept of Metallurgical and Materials Engineering, NIT Karnataka, Surathkal, Mangalore, India
- **Reviewing Committee Member of Trans. Indian Institute of Metals**
- **Reviewer of Journal of Materials Science**
- **Reviewer of Journal of Alloys and Compounds**
- **Reviewer of Metallurgical and Materials Transactions A**
- Reviewer of Materials Science and Engineering

RECOGNITIONS/AWARDS

- [“Apex Aspire Recognitions- 2006 Awards”](#), Tata Steel Limited, Jamshedpur
 - For the project: “Development of interstitial free steel (super extra deep drawing quality) for critical applications (autobody)” at the Managing Director level
 - Implemented in the plant of Tata Steel Limited, Jamshedpur, India and commercialized in the year 2007.
 - The project was successful in improving the drawability of IF-Ti steel from 1.9 to ~2.29 using batch annealing route.
 - The work was patented: Title--“Development of batch annealed Ti-stabilized IF steel with improved drawability by optimization of processing parameters” (Granted Patent No. 242358 dt 24.8.10, Govt of India).
 - A part of the work was also published in the ‘Metallurgical and Materials Transactions A’, 2007.
 - Besides, the work was presented at the ATM of IIM and at an international conference in the year 2006.
- Awarded [oral session prize at IIM-NMD-ATM 2015](#) for the presentation (Ferrous Category) on “Microstructural modification in cold drawn high carbon steel wires using electropulsing”
- [“Distinguished Woman in Engineering Award”](#) by Venus International Foundation, India, 2018

RESEARCH PUBLICATIONS/PAPER PRESENTATION

- ❑ [Kumkum Banerjee](#) and U. K. Chatterjee: Hydrogen Embrittlement of A HSLA-100 Steel in Seawater, [ISIJ international](#), Vol. 39, No. 1 (1999), pp. 47-55
- ❑ [K. Banerjee](#) and U. K. Chatterjee: Hydrogen Embrittlement of a HSLA-80 Steel in Seawater under Cathodic Charging Conditions, [Mater. Sci. Technol.](#), Vol. 16 (2000), pp. 517-523
- ❑ [K. Banerjee](#) and U. K. Chatterjee: Effect of Applied Potential on Hydrogen Embrittlement of Weld Simulated Hsla-80 Steel in Seawater, [British Corrosion Journal \(currently Corrosion Engineering, Science and Technology\)](#), Vol. 35, No. 4 (2000) pp. 273-278
- ❑ [Kumkum Banerjee](#) and U. K. Chatterjee: Hydrogen Permeation and Hydrogen Measurement on Cathodic Charging in HSLA 80 and HSLA 100 Steels, [Scripta Mater.](#), Vol. 44, No. 2 (2001) pp. 213-216

- ❑ [Kumkum Banerjee](#) and U. K. Chatterjee: Effect of Microstructure on Hydrogen Embrittlement of Weld-Simulated HSLA-80 and HSLA-100 Steels, **Metall. & Mater. Trans. A**, Vol. 34, 2003, pp. 1297-1309
- ❑ [Kumkum Banerjee](#) and A. D. Rollett: Microstructure and Crystallization Texture of a Low Carbon Strip Cast Steel, **Iron & Steelmaker**, Vol. 30, No. 6, June 2003, pp. 62-68
- ❑ [K. Banerjee](#), N. Roy, R.N. Ghosh and U.K. Chatterjee: Strain Rate Dependence of Plastic Flow Behaviour of HSLA-100 Steel in Seawater during Cathodic Charging of Hydrogen. **Trans. Indian Inst. Metals**, Vol. 57, No. 6, 2004. pp. 611-616
- ❑ [K. Banerjee](#), N. L. Richards and M. C. Chaturvedi: Effect of Filler Alloys on HAZ Cracking in Pre-Weld Heat Treated in 738LC GTA Weld, **Metall. & Mater. Trans. A**, Vol. 36, No. 7, July 2005, pp. 1881-1890
- ❑ [Kumkum Banerjee](#): Recrystallization texture evaluation in IF and EDD steels, **Tata Search**, Vol. 2, 2006, pp. 365-375
- ❑ [K. Banerjee](#): Evaluation of Annealing Texture in IF and EDD Steels, **Materials and Manufacturing Processes**, Vol. 22, 2007, pp. 462-468
- ❑ [Kumkum Banerjee](#): Evolution of Annealing Texture in Ti-Stabilized interstitial Free Steel, **Steel Grips**, Vol. 6, No. 4, 2008, pp. 278-282
- ❑ [K. Banerjee](#), A. K. Verma and T. Venugopalan: Improvement of Drawability of Titanium-Stabilized Interstitial-Free Steel by Optimization of Process Parameters and Texture, **Metall. & Mater. Trans. A**, Vol. 39, No. 6, 2008, pp.1410-1425
- ❑ [K. Banerjee](#) and T. Venugopalan: Development of Hypoeutectoid Graphitic Steel for Wires, **Mater. Sci. Technol.**, Vol. 24, No. 10, 2008, pp.1174-1178
- ❑ [Kumkum Banerjee](#), Matthias Militzer, Michel Perez and Xiang Wang: Non-Isothermal Austenite Grain Growth Kinetics in a Microalloyed X-80 Linepipe Steel, **Metall. & Mater. Trans. A**, Vol. 41, Dec 2010, pp.3161-3172
- ❑ [Kumkum Banerjee](#), Michel Perez and Matthias Militzer: Non-Isothermal Austenite Grain Growth Kinetics in The HAZ of A Microalloyed X-80 Linepipe Steel, **Solid State Phenomena**, Vols. 172-174, 2011, pp 809-814
- ❑ [Kumkum Banerjee](#): The Role of Magnesium in Superalloys—A Review, **Materials Sciences and Applications**, Vol. 2, No. 9, 2011, pp. 1243-1255
- ❑ [Kumkum Banerjee](#), Michel Perez and Matthias Militzer: Austenite Grain Growth Kinetics During Continuous Heating of a Microalloyed X-80 Linepipe Steel, **Materials Science Forum**, Vols. 715-716, 2012. pp. 292-296
- ❑ [Kumkum Banerjee](#), Krishnan Balasubramaniam and Issac Anto: Ultrasonic focused C-Scan imaging for the determination of weld quality of resistance spot welded nuggets in advanced high strength steel, **Journal of Non-Destructive Testing and Evaluation**, Vol. 3, Dec 2012, pp. 43-48
- ❑ [Kumkum Banerjee](#): Role of Base Metal Microstructure on Tensile Properties and Weldability of Simulated Continuously Annealed Advanced High Strength Steels, **International Journal of Metallurgical Engineering**, Vol. 2, No. 1, 2013, pp. 100-110
- ❑ [Kumkum Banerjee](#): Improving Weldability of an Advanced High Strength Steel by Design of Base Metal Microstructure, **Journal of Materials Processing Technology**, Vol. 229, March 2016, pp. 596-608
- ❑ [Kumkum Banerjee](#): Hydrogen Induced Cold Cracking in High Frequency Induction Welded Steel Tubes, **Metall. & Mater. Trans. A**, Vol. 47, Apr 2016, pp.1677-1685

- ❑ R. Rajeshkumar, K. Devakumaran and Kumkum [Banerjee](#): Role of interfacial microstructure on mechanical properties of cold metal transfer welded dissimilar A6061-T6 and A6082-T6 joints, **Materials Letters**, Vol. 279, 15, 2020, 128521
- ❑ R. Rajeshkumar, V. L. Niranjani, K. Devakumaran and Kumkum [Banerjee](#): Fusion boundary microstructure evolution and mechanical properties of cold metal transfer welded dissimilar A5754 and A5083 joint, **Materials Letters**, Vol. 284, Part 1, 2021, 128877.
- ❑ R. Rajeshkumar, V. L. Niranjani, K. Devakumaran and Kumkum [Banerjee](#): Evolution of non-dendritic equiaxed zone and its influence on mechanical properties of tungsten inert gas welded dissimilar A6061-T6 and A6082-T6 joint, **Materials Letters**, Vol. 303, 2021, 130569.
- ❑ R. Rajeshkumar, V. L. Niranjani, K. Devakumaran and [Kumkum Banerjee](#): Structure-property correlation of weld metal zone and interface regions of cold metal transfer welded dissimilar Al-Mg-Mn alloys joint, **Materials Today: Proceedings**, Vol. 46, Part 7, 2021, pp. 2498-2509
- ❑ Phani Mylavarapu, Chinmai Bhat, Manoj Kumar Reddy Perla and [Kumkum Banerjee](#): Identification of critical material thickness for eliminating back reflected shockwaves in laser shock peening – A numerical study, **Optics & Laser Technology**, 142(12), Oct 2021, 107217
- ❑ R. Rajeshkumar, K. Devakumaran and [Kumkum Banerjee](#): Microstructure and mechanical properties of stir zone in friction stir welded dissimilar A5754-H111 and A5083-H111aluminium alloy, *communicated to Mater. Sci. Eng.*
- ❑ [Kumkum Banerjee](#), A novel thermomechanical physical simulation technique for developing thin-slab-cast direct rolled Nb-V and Ti-Nb-V microalloyed X-70 linepipe steels, to be *submitted to Metall. Mater. Trans. A*
- ❑ Sooraj S Rao, [Kumkum Banerjee](#), Phani Surya Kiran: Internal friction characteristics of cold worked Armco Iron, *to be submitted to Mater. Sci Eng.*

Publication in Conferences Proceedings

- ❑ [Kumkum Banerjee](#) and U. K. Chatterjee: Hydrogen induced cracking of HSLA steels in seawater under potentiostatic conditions. Published in the Proceedings of the Third Pacific Rim International Conference on Advanced Materials and Processing (PRICM 3) (eds. M. A. Imam, R DeNale, S Handa, Z Zhong and D N Lee), The Minerals, Metals & Materials Society (TMS), pp. 173-177, at Honolulu, Hawaii, USA, July 12-16, 1998
- ❑ [Kumkum Banerjee](#) and U. K. Chatterjee: Microstructural dependence of hydrogen embrittlement in HSLA 80 and HSLA 100 steels (*Invited paper*). Published in the Proceedings of the International Conference on Processing and Manufacturing of Advanced Materials (THERMEC 2000) (eds. T Chandra, K Higashi, C Suryanarayana & C Tome) at Las Vegas, USA, December 2000
- ❑ [Kumkum Banerjee](#) and A D Rollett: Recrystallization and texture behavior of a low carbon strip cast steel. Published in the Proceedings of the International Conference on Advanced Materials and Materials Processing (ICAMMP-2002) (eds. N. Chakraborty and U. K. Chatterjee), pp. 431-435, Indian Institute of Technology, Kharagpur, India, 1-3 February 2002
- ❑ U. K. Chatterjee, [K. Banerjee](#) and A. K. Chakrabarti: An experience in the development of corrosion resistant reinforcement steel. Published in the Proceedings of the International Workshop and Conference on Construction Management and Materials (CONMAT 2003), Indian Institute of Technology, Kharagpur, India, 9-11 January 2003, 511-515

- ❑ [K. Banerjee](#), N. L. Richards and M. C. Chaturvedi: Published in the proceeding of American Welding Society on Recent Advances in Materials Processing Technology (RAMPT), 2005.
- ❑ [K. Banerjee](#): Evaluation of annealing texture in IF and EDD steel sheets. Published in the proceedings of International Conference on Advanced Materials and Materials Processing (ICAMMP-2006), Indian Institute of Technology, Kharagpur, India, 3-5 Feb., 2006
- ❑ [K. Banerjee](#), A. K. Verma and T. Venugopalan: Improvement of drawability of Ti-stabilized interstitial free high strength steel. Published in the Proceedings of International Conference “Microalloying 2007”, Bengal Engineering and Science University, Shibpur, Kolkata, India, 9-11 March, 2007
- ❑ [K. Banerjee](#) and U. K. Chatterjee: Hydrogen embrittlement of HSLA-80 and HSLA-100 steels (*Invited Paper*). Published in the Proceedings of International Conference “Microalloying 2007”, Bengal Engineering and Science University, Shibpur, Kolkata, India, 9-11 March, 2007
- ❑ [Kumkum Banerjee](#), M. Perez and M. Militzer: Non-Isothermal Austenite Grain Growth Kinetics in the HAZ of a Microalloyed X-80 Linepipe Steel. Published in the Proceedings of International Conference “Solid-Solid Phase Transformations in Inorganic Materials”, PTM 2010, held in Avignon, France, during 6-11 June 2010
- ❑ [Kumkum Banerjee](#), Michel Perez and Matthias Militzer: Austenite grain growth kinetics during continuous heating of a microalloyed X-80 linepipe steel. Published in the Proceedings of International Conference ReX & GG IV 2010 held in Sheffield, UK during 4-9 July 2010
- ❑ [Kumkum Banerjee](#): “Role of base metal microstructure on tensile properties and weldability of simulated continuously annealed advanced high strength steels” (*Invited paper*). Published in the Proceedings of 3rd International Conference “Thermomechanical Simulation and Processing of Steel” (SimPro 2012), held in RDCIS SAIL Ranchi, India during 12-14 Dec, 2012

Presentation at Conferences and Workshops

- ❑ [Kumkum Banerjee](#), B. Sasmal and U. K. Chatterjee: Some studies on hydrogen induced cracking in a HSLA-100 steel by slow strain rate technique. Presented at the 50th Annual Technical Meeting (ATM) of Indian Institute of Metals, New Delhi, held in Nov., 1996
- ❑ [Kumkum Banerjee](#) and U. K. Chatterjee: Environmental assisted cracking of HSLA-100 steels in seawater under cathodic protection conditions by slow strain rate technique. Presented at the Indo-US Project Review Meeting, New Delhi, held in March 1997
- ❑ [Kumkum Banerjee](#), B. Sasmal and U. K. Chatterjee: Hydrogen-induced cracking of HSLA-100 steel by slow strain rate technique. Presented at the 51st ATM of Indian Institute of Metals, Jamshedpur, held in Nov., 1997
- ❑ [Kumkum Banerjee](#) and U. K. Chatterjee: Hydrogen embrittlement of HSLA-80 steel in weld simulated conditions with different heat inputs. Presented at Annual Technical Meeting of Indian Institute of Metals, Kanpur, held in Nov., 1999
- ❑ [Kumkum Banerjee](#) and U. K. Chatterjee: Hydrogen embrittlement of weld simulated HSLA steels. Presented at the Indo-US meeting at Washington DC, USA, held in May 2000
- ❑ [K. Banerjee](#), N. Roy, R. N. Ghosh and U. K. Chatterjee: Mathematical modeling of plastic flow behavior of a cathodically charged HSLA-100 steel in seawater. Presented (poster) at the Annual Technical Meeting of Indian Institute of Metals, Bhubaneswar, held in Nov., 2001

- ❑ O. A. Ojo, [K. Banerjee](#), N. L. Richards and M. C. Chaturvedi: On the liquation cracking of cast Inconel 738LC superalloy. Presented at 15th Canadian Materials Science Conference, Nova Scotia, Canada, held in June 2003
- ❑ [K. Banerjee](#) and U. K. Chatterjee: Microstructural variation of HAZ in weld-simulated microalloyed HSLA-80 and HSLA-100 steels. Presented at the workshop on 'Cast and Forged Microalloyed Steels' at Ispat Niketan, Bullygunge Circular Road, Kolkata, held in Dec. 2005
- ❑ [K. Banerjee](#) and T. Venugopalan, Improvement of drawability of Ti stabilized interstitial free steel. Presented at the 60th Annual Technical Meeting (ATM) of Indian Institute of Metals, Jamshedpur, held in Nov., 2006
- ❑ [K. Banerjee](#) and T. Venugopalan: Study of precipitation behaviour and texture in a Ti-stabilized interstitial free steel. Presented at the 61st ATM of Indian Institute of Metals, Mumbai, held in Nov., 2007
- ❑ [Kumkum Banerjee](#), Michel Perez and Matthias Militzer: Prediction of austenite grain size in the presence of growing particles in the weld HAZ of a X-80 linepipe steel. Presented at the 63rd ATM of Indian Institute of Metals, Kolkata, held in Nov., 2009
- ❑ [Kumkum Banerjee](#), M. Perez and M. Militzer: Non-isothermal austenite grain growth kinetics in the HAZ of a microalloyed X-80 linepipe steel. Presented at the International Conference on Solid-Solid Phase Transformations in Inorganic Materials, PTM 2010, held in Avignon, France, during 6-11 June, 2010
- ❑ [Kumkum Banerjee](#), Michel Perez and Matthias Militzer: Austenite grain growth kinetics during continuous heating of a microalloyed X-80 linepipe steel. Presented at the ReX & GG IV 2010 International Conference, held in Sheffield, UK, during 4-9 July 2010
- ❑ [Kumkum Banerjee](#): Role of base metal microstructure on tensile properties and weldability of simulated continuously annealed advanced high strength steels, Presented at the 3rd International Conference "Thermomechanical Simulation and Processing of Steel" (SimPro 2012), held in RDCIS SAIL Ranchi, India during 12-14 Dec, 2012
- ❑ [Kumkum Banerjee](#): Represented the parent institute to present the course curricula in the TEQIP workshop "Materials and Metallurgical Curriculum" (an IIT Kanpur and Ministry of Human Resources, India, initiative), at NIT Srinagar, India, during Oct 08-09 2015
- ❑ [Kumkum Banerjee](#): Microstructural modification in cold drawn high carbon steel wires using electropulsing. Presented at the 69th Annual Technical Meeting (ATM) of Indian Institute of Metals, Coimbatore, India, held in Nov., 2015 (*awarded the 3rd best paper award*)
- ❑ [Kumkum Banerjee](#): Received invitation for *Keynote lecture* at the International Conference on Thermo-mechanical Simulation and Processing of Steels, SimPro' 16, held in RDCIS, SAIL Ranchi, India during 10-12 Feb 2016
- ❑ Sooraj S. Rao, Vamsi Krishna Rentala, Jijith M., Phani Mylavarapu, [Kumkum Banerjee](#): Applications of Internal Friction in Identifying Tight Fatigue Cracks, presented at the 26th National Seminar & International Exhibition on Non-Destructive Evaluation (NDE), held in Thiruvananthapuram, India, during 15 - 17 Dec 2016
- ❑ R. Rajeshkumar, K. Devakumaran and [Kumkum Banerjee](#): Welding of dissimilar A6061-T6 and A6082-T6 alloys using GTAW process. Presented at the International symposium on joining of materials-SOJOM 2018, Trichy during April 27-28, 2018

- ❑ Chinmai Bhat, Vamsi Krishna Rentala, Phani Mylavarapu and [Kumkum Banerjee](#): Laser Shock Peening (LSP) of Ti-6Al-4V Alloy and Residual Stress Measurements using XRD, presented at the National Conference on Processing of Materials (NCOPOM18), held at NITK Surathkal during Sept 19-21, 2018
- ❑ R. Rajeshkumar, K. Devakumaran and [Kumkum Banerjee](#): A study on microstructure and mechanical properties in friction stir welding of dissimilar A5754- A5983 aluminium alloys. Presented at the International conference on Advanced Materials and Manufacturing Processes for strategic sector-ICAMPS 2018, Trivandrum, India during December 25-27, 2018
- ❑ [Kumkum Banerjee](#): "Thermomechanical Simulation: A Reliable Route for Weld Heat Affected Zone Assessment and Product Development in Steels" (*Invited Paper*). Presented at the International THERMEC 2018, held in Paris, France, during 8-13 July, 2018
- ❑ Chinmai Bhat, Phani Mylavarapu, Vamsi Krishna Rentala and [Kumkum Banerjee](#): Significance of Residual Stress Measurement Parameters in X-Ray Based Diffraction Technique. Presented at the ISNT IGNITE NDE SYMPOSIUM 2018, CNDE, held in IIT Madras, India, on 3 Nov 2018
- ❑ R. Rajeshkumar, V. L. Niranjani, K. Devakumaran and [Kumkum Banerjee](#): Microstructure and mechanical properties of friction stir welded dissimilar A6061 and A6082 aluminium joint, Presentation at the 73rd Annual Technical Meeting (ATM), held in Kovalam, Trivandrum, held in Nov., 2019
- ❑ Chinmai Bhat, Phani Mylavarapu, [Kumkum Banerjee](#) and T. Jayakumar: Effect of Specimen Thickness on Laser Shock Peened Residual Stress- A Numerical Study. Presented at the International Conference on Advanced materials and Processes for Defense Applications, ADMAT 2019, held in Hyderabad, India, during 23-25 Sept 2019

BOOK CHAPTER

Book Chapter Title (*Invited*): "Physical Metallurgy and Drawability of Extra Deep Drawing and Interstitial Free Steels" for the book--"Recrystallization", ISBN 978-953-51-0122-2, Ed. Krzysztof Sztwiertnia, Publisher—InTech, March, 2012

PATENTS

- A method of making batch annealed Ti-stabilized interstitial free (IF) steel sheets or strips with improved drawability [**Granted** --**Patent No. 242358**; dated 27 Aug. 2010, Govt. of India, **Inventors:** [Kumkum Banerjee \(Principal Inventor\)](#), [T Venugopalan](#) and [N Gope](#); Assignee: Tata Steel Limited].
- Development of hypoeutectoid Graphitic Steel with Enhanced Drawability for Wires [**Granted** --**Patent No. 266385**; dated 8 May 2015, Govt. of India, **Inventors:** [Kumkum Banerjee \(Principal Inventor\)](#) and [T Venugopalan](#); Assignee: Tata Steel Limited].
- A Novel Etching Technique for the Determination of Prior Austenite Grain Size [**Granted**--**Patent No. 28627**; 18 Aug 2017; Govt. of India; **Inventor:** [Kumkum Banerjee](#); Assignee: Tata Steel Limited).
- A novel laboratory cooling set up for continuous annealing simulation to produce dual phase steels [**Granted**—**Patent No. 398607**; dated: 6 Jun 2022; Govt. of India; **Inventor:** [Kumkum Banerjee](#); Assignee: Tata Steel Limited].

- A cold-rolled continuously annealed weldable dual phase steel with tensile strength of 650-800 MPa and a process of manufacturing such a steel grade [**Granted—Patent No. 400692**; dated 1 Jul 2022; Govt. of India; **Inventor:** [Kumkum Banerjee](#); Assignee; Tata Steel Limited].
- A process for manufacturing of X-70 linepipe steel via thin slab casting and the direct rolling route [**Published, examined & reply filed** --Application No. 776/KOL/2015; Filed on 17 Jul 2015; Govt. of India; **Filed by:** [Kumkum Banerjee](#); Assignee: Tata Steel Limited].
- A novel technique for making an 1-kV electropulsing generator for generating favourable microstructure in steel [*to be filed*]

EXTRA CURRICULAR ACTIVITIES

- B. Mus in Vocal Classical Music (from Prayag Sangeet Samiti, Allahabad, India)
- Diploma in Nazrul Sangeet (from Bangiya Sangeet Parishad, West Bengal, India)

-----XXXXX-----