

Prof. Rajiv Shekhar
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Education

B.Tech. (Metallurgical Engg.): Indian Institute of Technology (IIT) Kanpur, 1982.
MS (Metallurgical Engg.): University of California, Berkeley, 1985.
PhD (Metallurgical Engg.): University of California, Berkeley, 1988.

Professional strengths

- a) Vision and Leadership: Transformed Indian School of Mines (ISM) Dhanbad into an IIT.
- b) 30 years of teaching and research experience with focus on industrial applications.
- c) Major expertise: Reactor design for the extraction of non-ferrous metals (Al, Ni, U).
- d) Multi-disciplinary expertise: Multi-layer electrodeposition, environmental remediation, manufacturing, solar thermal energy, metallurgical engineering plant design, engineering economics.
- e) Expertise in experiments and CFD-based mathematical modeling.
- f) Good understanding of process for scaling technology from laboratory to industry.
- g) Good contacts in industry, R&D organizations, and multi-lateral institutions.
- h) Unflinching loyalty to the organization and impeccable professional integrity.
- i) Excellent oral and written communication skills: Blogs on education, research, and technology in Times of India (Elephants can dance).

Professional experience highlights

- a) Research & Development
 - Design and fabrication of volumetric air receiver based solar thermal system.
 - Developing a novel, green solar convective furnace for materials processing.
 - Design of next-generation Hall-Heroult cells for aluminium smelting.
 - Reactor design for electrochemical refining of spent nuclear fuel.
 - Design of Pachuca tanks for leaching of non-ferrous ores.
 - Electroremediation (in-situ) of heavy metal contaminated soil.
 - Technology for drilling deep cooling holes in inconel for turbine blades.
- b) Leadership and Administration
 - Director, Indian Institute of Technology (Indian School of Mines) Dhanbad.
 - Set-up and led TEXMIN Foundation, a Rs. 110 crore company specializing in implementation of cyber-physical systems in mining and exploration at IIT(ISM).
 - Set-up the Naresh Vashisht Centre for Hydrogen and CCUS Technologies at IIT(ISM).
 - Set-up the Tata Steel Innovation Centre on Mining and Mineral Research at IIT(ISM).
 - Head, Department of Materials & Metallurgical Engineering (now re-named as Materials Science & Engineering), IIT Kanpur.
 - Established SIDBI Innovation and Incubation Centre, IIT Kanpur. It is rated among the best incubators in India.
 - Led the Masterplan development of the new IIT Jodhpur campus.
 - Member, Board of Governors/Executive Council, IIT Kanpur, AIIMS Deoghar, IIIT Ranchi.

Detailed Curriculum Vitae

Date of Birth

June 25, 1960

Education

B.Tech. (Metallurgical Engg.): Indian Institute of Technology (IIT) Kanpur, 1982.

MS (Metallurgical Engg.): University of California, Berkeley, 1985.

PhD (Metallurgical Engg.): University of California, Berkeley, 1988.

Professional Experience

- Director (3/2018 – 6/2023), IIT(ISM) Dhanbad.
- Visiting Faculty (12/2011 – 12/2013), IIT Jodhpur.
- Professor (2001–): Materials Science and Engineering, IIT Kanpur.
- Associate Professor (1997 – 2001): Materials and Metallurgical Engineering, IIT Kanpur.
- Assistant Professor (1990 – 1997): Materials and Metallurgical Engineering, IIT Kanpur.
- Asst. Research Engineer (5/1988 – 3/1990): University of California, Berkeley.

Leadership and Administrative Experience

1. Director (3/2018 – 6/2023), Indian Institute of Technology (Indian School of Mines) Dhanbad: *Completely revamped the (i) academic curriculum, (ii) research focus and infrastructure, (iii) academic and administrative governance systems, and (iv) sports and student governance system of ISM Dhanbad in line with older IITs.*

Academics

- a) Both the UG and PG curriculum have been completely revamped with the introduction of choice-based credit system (CBCS) along with department and open electives. Double Major, Dual Degree and integrated PhD programs were introduced.
- b) New academic programs have started: (i) M.Tech. in Data Analytics, Pharmaceutical Science and Engineering, (ii) MBA in Business Analytics, and (iii) MA in Digital Humanities and Social Science, (iv) Two online, Executive M.Tech. programs approved in Microelectronics and semiconductor technology and Geomatics.
- c) Funds sanctioned for R&D projects increased from Rs 15 crore in FY 2018-19 to Rs 69 crores in FY2022-23.
- d) Invested ~Rs. 70 crores since 2018 in substantially upgrading UG/PG laboratory and Central Research Facility infrastructure.
- e) The quality of publications increased significantly. From 2018 - 2022, the number of q1/q2 publications of Web of Science increased from 523 (52%) – 919 (72%). This corresponded to a productivity increase from 1.8 to 2.7 publications per faculty.
- f) Completely automated the Academic and R&D governance systems.
- g) Set-up the Naresh Vashisht Centre for Hydrogen and CCUS Technologies through a Rs. 10 crore gift.
- h) Set-up the Rs. 23 crore Tata Steel Innovation Centre on Mining and Mineral Research.
- i) Advanced negotiations were underway to set-up two pilot plants in association with industry: (i) 2t/h high ash coal gasification plant with IOCL and L&T and (ii) composite ammonia dissociation and hydrogen combustion unit with Technip Energies in our proposed industrial park at the new campus in Nirsa.

- j) Initiated offering of online NPTEL courses. Nine courses are already online.

Innovation and Entrepreneurship

- a) Created a vibrant Institute Innovation Hub (I2H) consisting of:
- i) TEXMIN Foundation, a Rs. 110 crore company specializing in cyber-physical technology development, services, and human resource development in the areas of mining and exploration at IIT(ISM) Dhanbad. It has collaboration with major technology providers and mining companies and has assets worth more than Rs 450 crores.
 - ii) The Naresh Vashisht Centre for Tinkering and Innovation (NVCTI) for training and product development in AI, digital technologies, robotics, and smart manufacturing for systematically leveraging the “untapped” potential of undergraduate students. It was set-up with a gift of Rs. 8 crores
 - iii) ACIC Foundation, a section 8 company of the Atal Innovation Community Centre with a major focus on women empowerment.
- b) Started a minor in Product Development Internship for UG students where students develop a product.
- c) Started a unique field-based course on Social Entrepreneurship to give students exposure to problems at the ground level in education, health, environment, and marginalized communities.

Student Activities

- a) Establishment of Students’ Gymkhana with an elected Senate for active participation in the Institute’s academic and administrative governance system.
- b) Setting up a student counselling service at IIT(ISM) for the first time. Also engaged an Online 24x7 counselling Platform “YOUR DOST, ” which has proved to be a boon for students. I personally monitored and engaged with “red-flagged” students.
- c) Significantly upgraded sports activities (i) by hiring coaches in all sporting disciplines for the first time ever and (ii) improvement in both indoor and outdoor sports infrastructure. IIT(ISM) came 9th in the last two Inter-IIT sports meet, with the best women athlete prize in 2019 and 7th in 2022.
- d) 24x7 access to students through email, cell phone, WhatsApp, and my “open” office hours.

Administrative Governance

- a) Introduced a comprehensive WhatsApp-based communication system for all sections of the institute for fast response.
- b) Streamlined and set up a rigorous, transparent, 4-stage new faculty selection system and introduced external peer review system for selection to the positions of Associate Professor and Professor.
- c) From 2019 onwards, 135 offer letters were issued and 102 new faculty joined the institute.
- d) Approval of a new, comprehensive “Cadre Structure and Recruitment Rules” for non-teaching employees after I joined IIT(ISM).
- e) A total of 253 non-teaching staff and officers have been recruited in my tenure. 109 internal employees have been promoted since 2020.
- f) File movement was completely automated by implementation of e-office since 2021.
- g) Government e marketplace (GeM) was implemented in letter and spirit.
- h) Completely streamlined the operations of Campus Management Unit, Store and Purchase section, Health Centre, Guest House Commercial establishment and security unit.

2. IIT Kanpur (1990 – 2018)

- a) Chairperson, Senate Undergraduate Committee (9/2016 – 3/2018), IIT Kanpur.
- b) Member (1/2010 – 12/2011), Board of Governors, IIT Kanpur.
- c) Head (1/2006 – 1/2009), Dept. of Materials and Metallurgical Engineering (re-named as Materials Science and Engineering), IIT Kanpur
- i) Framed long-term research vision.
 - ii) Established mentoring system for academically deficient UG students.

- iii) Industrial networking of new faculty.
- iv) Doubling teaching laboratory facilities and laboratory modernisation.
- v) Introduced a transparent faculty hiring system.
- vi) Streamlined the accounts and inventory system of the department.
- d) Member, Institute Academic Review Committee (2000 and 2008).
- e) Head, SIDBI Innovation and Incubation Centre, IIT Kanpur (2003 – 2006)
 - i) Established the Business Incubator.
 - ii) Set-up the Intellectual Property Rights and Technology Transfer Office
 - iii) Started an Entrepreneurship Internship Programme for students of IIT Kanpur and other engineering colleges located in Kanpur.
- f) Coordinator, Small-Scale Industries Cell, IIT Kanpur (2003 - 2006)
 - i) New Business Opportunities workshops for Small-Scale industries Personnel from Kanpur.
 - ii) Skill-based extension courses for industry personnel and students from local colleges in Kanpur.
- g) Chairman, Health Centre Users Committee, IIT Kanpur (2002 – 2004)
 - i) Implemented a new, cost-efficient, cashless health scheme for IIT Kanpur employees, which continues to this day.
 - ii) Reduced medicine budget by 20% by streamlining the medicine procurement system.
- h) Treasurer, Students' Gymkhana, IIT Kanpur (2000 – 2002)
- i) Member Civil Advisory Committee, Institute Works Department, IIT Kanpur (2000 – 2001).

3. IIT Jodhpur (12/2011 – 12/2013)

- a) Faculty i/c Campus Development, IIT Jodhpur: Led the Masterplan development of the new campus.
- b) Head, Centre for Solar Energy Technologies (12/2011 – 12/2013), IIT Jodhpur.
- c) Coordinator, Centre of Excellence in Energy (1/2012 – 7/2013), IIT Jodhpur.

Areas of Specialisation

Application of transport phenomena and electrochemistry for process/reactor design in extractive metallurgy, manufacturing, pollution control, and solar thermal power using experiments and CFD-based mathematical modeling.

Areas of Research

1. Volumetric air receiver design for solar thermal energy generation with application in metals processing.
2. Advanced Hall-Heroult cells for primary aluminium production.
3. Air-agitated Pachuca tanks for leaching.
4. Electrochemical refining of spent oxide and metallic nuclear fuels
5. Reduction of Indian nickeliferous ores.
6. Electroremediation of heavy metal contaminated soils
7. Electrochemical deposition of magnetic multilayers for GMR applications.
8. Electrochemical drilling of deep cooling holes in turbine blades.
9. Electrochemical surface modification techniques.

Major Research Achievements

1. Design of a novel, green solar convective furnace for materials processing.
2. Design and fabrication of volumetric air receiver based solar thermal system.
3. Design of next-generation Hall-Heroult cells for aluminium smelting.
4. Design of Pachuca tanks for leaching of uranium.
5. Electroremediation of Cr(VI) contaminated soils.

6. Technology for drilling deep holes in super alloys using “shaped tube electrochemical drilling” to enhance cooling in turbine blades.

Teaching Experience

Introduction to Manufacturing Processes (UG¹-Core), Metallurgical Kinetics (UG), Unit Operations in Extractive Metallurgy (UG), Process Plant Design for Metallurgical Engineering Operations (UG), Principles of metal extraction and refining (UG), Fluid Mechanics (for Mechanical Engineering UG students at IIT Jodhpur), Heat and Mass Transfer (PG), Electrochemical Technology in Materials Processing (PG).

Sponsored Projects

1. “Establishing a centre of excellence in solar thermal research and education at IIT Jodhpur,” MNRE, September 2011 – August 2016, Rs. 40 crores, (with several faculty from IIT Jodhpur). Was PI² till November 2013.
2. “Development of the International Center for Application of Solar Energy Technologies,” Asian Development Bank, January 2012 – June 2014, US\$200,000, (with Dr. L. Chandra of IIT Jodhpur). Was PI till November 2013.
3. “Development of magnetic field sensors based on metallic multilayers with high magnetoresistive sensitivity,” ARMREB (DRDO), October 2007 – September 2009, Rs. 22.65 lakhs (with Prof. M. Katiyar).
4. “Aqueous Nitriding of Steels by Electrolyte Plasma: Kinetics, Design, and Scale-up,” DST, New Delhi, August 2007 – March 2010 (with Prof. R. C. Sharma and Prof. R. K. Thareja), Rs. 18.27 lakhs
5. “Molten salt electrodeposition of rare-earths and actinides,” BRNS, DAE, Govt. of India, June 2004 – March 2008, Rs. 21.16 lakhs.
6. “Electroremediation of Heavy Metal Contaminated Soils: Pilot-Scale Studies for Technology Development,” MHRD, Govt. of India, April 2003 – March 2005, Rs. 8 lakhs.
7. “Electrodeposition of magnetic multilayers with high giant magnetoresistance,” ARMREB
8. (DRDO), November 2002 – October 2005. (with Prof. M. Katiyar).
9. “The analysis of fused deposition through electrochemical discharge,” DST, New Delhi, April 2002 - March 2005 (with Prof. A. Ghosh)
10. "Electroremediation of heavy metal contaminated soil: Design, scaleup and optimisation," CSIR, New Delhi, April 2000 - March 2003 (in collaboration with Regional Research Laboratory, Bhubaneswar).
11. “Design and development of shaped tube pulse electrochemical machining for drilling deep microholes in inconel alloys,” DST, Govt. of India, New Delhi, April 2001– March 2003 (with Prof. V. K. Jain).
12. "Studies on magnetohydrodynamics in electrically driven melt flow," DST, Govt. of India, New Delhi, April 1995 – March 2001 (with Prof. S. P. Mehrotra).
13. “Reclamation of values from industrial wastes and effluents,” AICTE, New Delhi, April 1995 – March 1999 (with Prof. S. P. Mehrotra).
14. "Design, scaleup and optimisation of Pachuca tanks," BRNS, Department of Atomic Energy, April 1992 - June 1995 (with Prof. S. P. Mehrotra).

Consultancy Projects

1. “Identification of suitable business opportunities,” **Shree Cements Pvt. Ltd., Kolkata**, Rs. 6.35 lakhs, April 2010 – September 2010.
2. “Modelling of the electrorefining cell in the pyroprocessing demonstration facility,” **IGCAR**,

¹ UG = Under-graduate, PG = Post-graduate.

² PI = Project Investigator

Kalapakkam, Rs. 15.0 lakhs, April 2008 – March 2010.

3. “Determining the commercial feasibility of manufacturing silicon and a mineral-related plant,” Shree Cements Pvt. Ltd., Kolkata, Rs. 1.34 lakhs, March 2008 – October 2008.
4. “Day ahead auction software for power exchange,” National Commodity & Derivatives Exchange Limited (NCDEX), Mumbai, Rs. 5.0 lakhs, October 2006 – February 2007 (with Prof. P. K. Kalra).
5. “Prefeasibility studies for identifying training needs by electric distribution utilities,” Institute of International Education (IIE), Washington, D.C. (U.S.A.), Rs. 5.0 lakhs, May 2004 (with Prof. P. K. Kalra).
6. "Development of an integrated software platform for evaluating Environmental Impact Assessment reports of thermal power plants," **Infrastructure Development and Finance Company, Mumbai**, Rs. 8.0 lakhs, August 2000 - August 2002.
7. "Achieving refractory consumption of international benchmark level in integrated steel plants," RDCIS, SAIL, Ranchi, Rs. 13.0 lakhs, October 1999 - June 2002 (with Prof. N. N. Kishore and Prof. P. K. Kalra).
8. “Use of slotted anodes to achieve power saving in pots of HINDALCO,” **Accenture Inc.**, New Delhi, Rs. 0.75 lakhs, January 2001 – February 2001.

Patents Granted

1. V. K. Jain, D. S. Bilgi, A. V. Kulkarni, A. Chavan, R. Shekhar: “Process for drilling contoured deep hole in super alloys using STED to enhance cooling in turbine blades,” 2007.

Publications in Refereed Journals

1. Vishwa Deepak Kumar, Laltu Chandra, Sudipto Mukhopadhyay, Rajiv Shekhar: “Simulated experimental assessment of a laboratory-scale solar convective furnace system,” Journal of Solar Energy Engineering, v 145(4), 2023, pp. 041011 (1-11).
2. Vishwa Deepak Kumar, Gurveer Singh, Laltu Chandra, Sudipto Mukhopadhyay, Rajiv Shekhar : “A multi-zone unsteady heat transfer model for an open volumetric air receiver: a step towards scale-up and design optimization,” International Journal of Heat and Mass Transfer, v 191, 2022, <https://doi.org/10.1016/j.ijheatmasstransfer.2022.122747>.
3. P. Sharma, L. Chandra, P. S. Ghoshdastidar, R. Shekhar: “ A novel approach for modelling fluid flow and heat transfer in an open volumetric air receiver using ANSYS-FLUENT,” Solar Energy, v 204, 2020, pp. 246-255.
4. G. Singh, V. Kumar, P. S. Ghoshdastidar, R. Shekhar, L. Chandra: “One-dimensional zonal model for the unsteady heat transfer analysis in an open volumetric air receiver,” Accepted for publication, J Therm Sci Eng Appl, v 13, 2021, pp. 011011.
5. N. Shukla, M. K. Harbola, K. Sanjay, R. Shekhar: “Electrochemical fencing of Cr(VI) from industrial wastes to mitigate ground water contamination,” Trans Indian Inst Met, v 70, 2017, pp. 511-518.
6. D. Patidar, S. Tiwari, P. Sharma, R. Pardeshi, L. Chandra, R. Shekhar: “Solar convective furnace for metals processing,” JOM, v 67, 2015, pp. 2696-2704.
7. G. Singh, D. Saini, N. Yadav, L. Chandra, R. Shekhar: “Dust Deposition Mechanism and Cleaning Strategy for Open Volumetric Air Receiver Based Solar Tower Sub-systems,” Energy Procedia, v 69, 2015, pp. 2081-2089.
8. P. Sharma, R. Sarma, L. Chandra, R. Shekhar, P. S. Ghoshdastidar: “On the design and evaluation of open volumetric air receiver for process heat applications,” Solar Energy, v 121, 2015, pp. 41-55.
9. Ajeet K Srivastav, Rajiv Shekhar: "Nucleation and growth mechanism of Co-Pt alloy nanowires electrodeposited within alumina template," Journal of Nanoparticle Research, v 17, 14, 2015.
10. P. Sharma, R. Sarma, L. Chandra, R. Shekhar, P. S. Ghoshdastidar: "Solar tower based aluminium heat treatment system: Part I. Design and evaluation of an open volumetric air receiver," Solar Energy, v 111, 2015, pp. 135-150.
11. D. Patidar, S. Tiwari, P.K. Sharma, L. Chandra, R. Shekhar: “Open volumetric air receiver based

- solar convective aluminum heat treatment furnace system,” Energy Procedia, v 69, 2015, pp. 506-517.
12. V. Kumar, Govind, K. Philippe, K. Balani: “Processing and nano-mechanical characterization of Mg-Li-Al based Alloys,” Procedia Materials Science, v 5, 2014, pp. 585–59.
 13. N. Gupta, R. Shekhar, P. K. Kalra: “Computationally efficient composite transmission expansion planning: a pareto optimal approach for techno-economic solution,” accepted for publication, International Journal of Electrical Power and Energy Systems, v 63, 2014, pp. 917-926.
 14. A. K. Srivastav, R. Shekhar, “Crystal anisotropy induced temperature dependent magnetization in cobalt nanowires electrodeposited within alumina template,” Journal of Magnetism and Magnetic Materials, v 349, 2014, pp. 21-26.
 15. M. Karnik, A. Ghosh, R. Shekhar, “The mechanism of electrochemical discharge (ECD),” Key Engineering Materials, v 572, 2014, pp. 295-299.
 16. N. Gupta, R. Shekhar, P. K. Kalra: “Probabilistic transmission expansion planning: congestion management based roulette wheel simulation for optimal capacity,” International Journal of Electrical Power and Energy Systems, v 43, 2012, pp 1259-1266.
 17. K. Sanjay, R. P. Das, R. Shekhar, : “Electroosmotic pump: “Rate controlling mechanism for unusually fast electroremediation kinetics of Cr(VI) in basic Kanpur soil,” Electrochimica Acta, v 86, 2012, pp. 80-88.
 18. V. Kumar, Govind, R. Balasubramaniam, R. Shekhar, K. Balani: “Microstructure evolution and texture development in thermomechanically processed Mg–Li–Al based alloys,” Mater. Sci. Eng. A, v 547, 2012, pp. 38–50.
 19. V. Kumar, R. Balasubramaniam, R. Shekhar, K. Balani: “Microstructure and texture evolution during hot rolling of Mg-9Li-7Al-1Sn alloy for aerospace application,” Material Science Forum, v 702-703, 2012, pp. 85-88.
 20. K. Shiva Kumar, A. Roy, A. Raghunath, R. C. Sharma, R. Shekhar: “Feasibility and kinetics of nitriding of pure titanium and Ti-6Al-4V in the molten salt bath of potassium nitrate Surface Engineering,” Surface Engineering, v 28, 2012, pp. 458-463.
 21. K. Sanjay, R. Shekhar: “Electrokinetic cleaning of industrial residues,” Trans. Inst. Min. Metall. C, v 121, 2012, pp. 117-120.
 22. V. Kumar, Govind, R. Shekhar, K. Balani: “Effect of hot rolling on microstructure and texture evolution of Mg-Li based alloy,” Material Science Forum, v 690, 2011, pp. 347-350.
 23. M. Karnik, A. Ghosh, R. Shekhar, “Polarity dependence of the electrochemical discharge(ECD),” Key Engineering Materials, v 486, 2011, pp. 131-134.
 24. R. Thudum, A. Srivastava, S. Nandi, A. Nagaraj, R. Shekhar: “Molten salt electrolysis of neodymium: electrolyte selection and deposition mechanism,” Trans. Inst. Min. Metall. C, v 119 (2), 2010, pp. 88-92.
 25. M. Karnik, A. Ghosh, R. Shekhar: “Fused deposition process combining electrochemical discharge with high speed selective jet electrodeposition,” Trans IMF, v 87 (5), 2009, pp. 264-271.
 26. A. Roy, S. J. Parihar, A. Singh, R. C Sharma, R. Shekhar: “Quench hardening of 0.4 % C steel by using aqueous electrolyte plasma as heat source,” Surface Engineering, v 25 (6), 2009, pp.423- 429.
 27. D. Pradhan, T. Sripadmini, P. Pradhan, M. Katiyar, and R. Shekhar: “Effect of electrode configuration and mode of deposition on magnetoresistance in electrodeposited Co/Cu multilayers on n-Si by a fully electrochemical method,” Electrochimica Acta, v 54 (2), 2008, pp. 430-433.
 28. D. S. Bilgi, R. Kumar, V. K. Jain, R. Shekhar: “Predicting Radial Overcut in Deep Holes Drilled by Shaped Tube Electrochemical Machining,” International Journal of Advanced Manufacturing Technology, v 39 (1-2), 2008, pp. 47-54.
 29. A. Roy, R. K. Tewari, R.C. Sharma, R. Shekhar: “Aqueous electrolyte plasma nitriding: A feasibility study,” Surface Engineering, v 23, 2007, pp. 243-246.
 30. S. N. Lenka, S. P. Mehrotra, R. Shekhar: “Magnetohydrodynamics in advanced Hall-Heroult cells: Physical modelling of flow in a laboratory-scale cell, Trans. Inst. Min. Metall. C, v 116, 2007, pp. 177-182.
 31. D. Bhunia, S. P. Mehrotra, R. Shekhar: “A novel probe for measuring current distribution in wood’s metal in a simulated Hall-Heroult cell,” Trans. Inst. Min. Metall. C, v 115, 2006, pp.

206-212.

32. M. Sankar, N. K. Batra, R. Shekhar, and S. P. Mehrotra: "Roasting, reduction and leaching of Indian ilmenite ore for producing synthetic rutile," Trans. Indian Institute of Metals, v 59, 2006, pp. 381-387.
33. D. S. Bilgi, V. K. Jain, R. Shekhar, A. V. Kulkarni: "Hole quality and interelectrode gap dynamics during pulse current electrochemical deep hole drilling," International Journal of Advanced Manufacturing Technology, v. 34, 2007, pp. 79-95.
34. D. S. Bilgi, V. K. Jain, R. Shekhar, S. Mehrotra: "Electrochemical deep hole drilling in super alloy for turbine application," Journal of Materials Processing Technology, v 149, 2004, pp. 445-452
35. K Sanjay, A Arora, R Shekhar and R P Das: "Electroremediation of Cr(VI) Contaminated Soils: Kinetics and Energy Efficiency," Colloids and Surfaces A: Physicochemical and Engineering Aspects, vol. 222, 2003, pp. 253-259
36. M Manna, K Sanjay, R Shekhar: "Electrochemical Cleaning Of Soil Contaminated With A Dichromate Lixiviant," International Journal of Mineral Processing, vol. 1696, 2003, pp. 401-406
37. S. Sharma, V. K. Jain and R. Shekhar: "Electrochemical drilling of inconel superalloy with acidified NaCl electrolyte," International Journal of Advanced Manufacturing Technology, vol. 19, 2002, pp. 492-500.
38. S. P. Mehrotra and R. Shekhar: "Particle suspension in air-agitated Pachuca tanks: Investigation of hysteresis and a novel split air injection technique," Metallurgical and Materials Transactions B, vol. 32B, April 2001, p. 223.
39. G. G. Roy, R. Shekhar and S. P. Mehrotra: "Particle suspension in (air-agitated) Pachuca tanks," Metallurgical and Materials Transactions B, vol. 29B, April 1998, p. 339.
40. T. Chandrashekar, R. Shekhar and S. P. Mehrotra: "Solid-liquid mass transfer in air-agitated Pachuca tanks," Transactions of the Institution of Mining & Metallurgy, Section C, vol. 107, 1998, p. C151.
41. N. K. Nath, N. Chakraborti and R. Shekhar: "Reduction of Indian nickeliferous ore with gas flowing vertically through the bed," Scandinavian Journal of Metallurgy, vol. 27, 1998, p. 14.
42. N. K. Nath, N. Chakraborti and R. Shekhar: "Reduction of Indian nickeliferous ore with gas flowing horizontally over the bed," Scandinavian Journal of Metallurgy, vol. 26, 1997, p. 158.
43. G. G. Roy and R. Shekhar : "Oxygen mass transfer in (air-agitated) Pachuca Tanks: Part II: Mathematical modelling of mass transfer coefficients," Transactions of the Institution of Mining & Metallurgy, Section C, vol. 105, 1996, p. C16.
44. G. G. Roy and R. Shekhar: "Oxygen mass transfer in (air-agitated) Pachuca Tanks : Part I Laboratory- scale experimental measurements," Transactions of the Institution of Mining & Metallurgy, Section C, vol. 105, 1996, p. C9.
45. R. Shekhar and J. W. Evans: "Physical Modelling studies of electrolyte flow due to gas evolution and some aspects of bubble behaviour in Advanced Hall Cells: Part III Predicting the performance of advanced Hall cells," Metallurgical Transaction B, February 1996, p. 19.
46. N. K. Nath, N. Chakraborti and R. Shekhar: "Selective reduction of nickeliferous ore : Part I Single pellet experiments," Scandinavian Journal of Metallurgy, vol. 24, 1995, p. 121.
47. R. Shekhar and J. W. Evans: "Physical Modelling studies of electrolyte flow due to gas evolution and some aspects of bubble behaviour in Advanced Hall Cells: Part II Flow and interpolar resistance in cells with a grooved anode," Metallurgical Transaction B, June 1994, p. 341.
48. R. Shekhar and J. W. Evans: "Physical Modelling studies of electrolyte flow due to gas evolution and some aspects of bubble behaviour in Advanced Hall Cells: Part I Flow in cells with a flat anode," Metallurgical Transaction B, June 1994, p. 333.
49. R. Shekhar and J. W. Evans: "Fluid flow and interpolar resistance measurements in Advanced Hall- Heroult cells," Mineral Processing and Extractive Metallurgy Review Vol. 9, 1992. p. 135.
50. R. Shekhar and J. W. Evans: "Fluid flow in Pachuca (air agitated) tanks. Part II: Mathematical Modelling of flow in Pachuca Tanks." Metallurgical Transaction B, December 1990, p.191.
51. R. Shekhar and J. W. Evans: "Fluid flow in Pachuca (air agitated) tanks. Part I: Laboratory-scale experimental measurements," Metallurgical Transaction B, December 1989, p.781.

Papers Published in Conference Proceedings

1. D. K. Singh, R. Shekhar, P. K. Kalra: "Optimal load shedding: An economic approach," IEEE Region 10 Annual International Conference, Proceedings/TENCON, art. no. 5686763, 2010, pp. 636-639.
2. Vinod Kumar, V.S. Raja, Rajiv Shekhar, P. Mungole, P. P. Sinha, Kantesh Balani: "Electrochemical Corrosion study of Novel Mg-Li Alloys," International conference proceedings CORCON 2010 Corrosion Conference and Expo 2010, Goa, India, Sept. 23 – 26, 2010.
3. N. Shukla, K. Sanjay, M. K. Harbola, R. Shekhar: "An electrochemical technique for minimizing soil and ground water contamination by heavy metals leached from solid industrial wastes," TMS Annual Meeting, 2010, pp. 285-292.
4. Madhuri Karnik, R. Shekhar, and A. Ghosh: "Experimental study of fused deposition through electrochemical discharge," Proceedings of the 7th Japan-India Joint seminar, 2004, Tokyo, pp. 111-118.
5. M. Manna, K. Sanjay, R. Shekhar, and G. P. Bajpai: "Electroremediation of heavy metal contaminated soils," 18th National Convention of Environmental Engineers & National Seminar on Solid Waste management, Bhopal, October 19 – 20, 2002.
6. M. G. Sujana, K. Sanjay and Rajiv Shekhar: "Behaviour of Hexavalent Chromium During electroremediation," Proceedings of 39th National Metallurgists' Day and 55th Annual Technical Meeting of the Indian Institute of Metals, 18 – 21 Nov, 2001, pp. 301-302.
7. R. Shekhar and J. W. Evans: "Liquid velocities in air-agitated Pachuca tanks," in Hydrometallurgical Reactor Design and Kinetics, March 1986, New Orleans, Eds: R. G. Bautista, R. J. Wesley and G. W. Warren, The Metallurgical Society, 1986, p. 121.
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2. P. K. Sharma, R. Sarma, L. Chandra, R. Shekhar, P. S. Ghoshdastidar: "Effect of sand deposition on heat transfer in an open volumetric air receiver," SolarPACES, Las Vegas, 2013.
3. N. Yadav, L. Chandra, P. Pradeep Kumar and R. Shekhar: "Application of fluid dynamics for designing sub-systems in concentrated solar tower technology," Invited presentation, ICAFD, Botswana, 2012.
4. K. Sanjay and R. Shekhar: "Role of Mathematical Modeling in Designing Electroremediation Projects for the In-Situ Cleaning of Heavy Metal Contaminated Soils," International seminar on Mineral Processing Technology–2007 (MPT-2007), Indian Institute of Technology Bombay, Mumbai, February 22-24, 2007.
5. R. Shekhar and R. Misra: "Innovation and entrepreneurship in Indian universities: "A case study of the technology business incubator at the Indian Institute of Technology, Kanpur," Conference on "The Triple Helix Paradigm for Development: Strategies for Cooperation and Exchange of Good Practice", Bristol, UK, 17-19 September 2006.
6. K. Sanjay, A. Arora, R. Shekhar and R. P. Das: "Electroremediation of heavy metal contaminated soils," International Symposium on Electrokinetic Phenomena, Cracow, Poland, August 18 – 22, 2002.
7. G. G. Roy, B. Basu, R. Shekhar and S. P. Mehrotra: "Mathematical modelling of heat flow and ledge profile in Hall-Heroult cells: Comparison of cells operated with semi-graphitic and conventional anthracite cathode blocks," Annual meeting of Indian Institute of Metals, November 1996, New Delhi.

8. G. G. Roy, R. Shekhar and S. P. Mehrotra: "Particle suspension in Pachuca tanks," Annual meeting of Indian Institute of Metals, November 1994, Vishakapatnam.
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Thesis Supervision

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1. A. Gupta, 2017, "Hydrodynamic design of drained cathode Hall-Héroult cell," Dr. B. Basu, ABSTL (Co-guide).
2. Piyush Sharma, 2017, "Design of open volumetric air receiver for concentrated central solar tower system," Dr. P. Ghoshdastidar, Dr. L. Chandra, IIT Jodhpur (Co-guides).
3. D. Singh, 2012, "Combinational load shedding methodology for power distribution system," Dr. P. K. Kalra (Co-guide).
4. N. Gupta, 2012, "Transmission expansion planning," Dr. P. K. Kalra (Co-guide).
5. Vinod Kumar, 2011, "Microstructural, mechanical and electrochemical characterization of thermomechanically processed Mg-Li-Al based alloys" Dr. K. Balani, Dr. R. Balasubramaniam (Co-Guide).
6. K. Sanjay, 2008, "Electroremediation of Cr(VI) contaminated soils: Kinetics, design and scale-up."
7. M. Karnick, 2007, "Fused deposition through electrochemical discharge," Dr. A. Ghosh (Co-guide)
8. D. S. Bilgi, 2005, "Electrochemical deep hole drilling in superalloys" Dr. V. K. Jain (Co-guide).
9. G. G. Roy, 1996, "Gas liquid mass transfer and particle suspension in air-agitated Pachuca tanks."
10. N. Nath, 1995, "Reduction roasting of nickeliferrous ore in multiple hearth furnace," Dr. N. Chakraborti (Co-guide).

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1. D. Kumar, 2013, "Design and evaluation of experimental thermal energy storage," Dr. L. Chandra, IIT Jodhpur (IITJ) (Co-guide).
2. R. N. Verma, 2013, "High heat flux characterization and power balance of non-transfer plasma jet," Dr. L. Chandra, IITJ) and Dr. P. K. Jayakumar, NIFTDC, Hyderabad (Co-guides).
3. V. K. Verma, 2013, "Design and development of glass-metal joints and their characterization for solar receiver tube," Dr. R. Chhibber, IIT and Dr. L. Abhinandan, RRCAT (Co-guides).
4. R. Sarma, 2013, "Design and analysis of recirculating air system in an open volumetric air receiver," Dr. L. Chandra, IITJ (Co-guide).
5. P. Ranjan, 2010, "Electrodeposition and characterization of Co/Cu multilayers on silicon (100)."
6. B. Das, 2009, "Physical modeling of electrorefining cell for spent nuclear fuel."
7. S. Kumar, 2009, "Synthesis of iron oxide nanoparticles by plasma electrolysis," Dr. R. C. Sharma (Co-guide).
8. N. Shukla, 2009, "Real time electroremediation of Cr (VI) laden residue dump sites."
9. A. Maiti, 2009, "Electrochemical nitriding of iron in molten potassiumnitrate salt bath at 550 C" Dr. R. C. Sharma (Co-guide).
10. R. Kumar, 2008, "Electrochemical deposition and characterization of co/cu multilayers on silicon (100)."
11. S. Nandi, 2008, "Electrochemical studies: 1. Cyclic voltammetry studies of Nd deposition from molten salts. 2. Numerical modeling of flow in mechanically agitated tanks."
12. Y. Chakravarthy, 2008, "Oxygen measurement and control strategies for corrosion mitigation

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 18. Pradeep Pradhan, 2006, “Pulse electrodeposition of Cu/Cu multi layers on Si (100) for giant magnetoresistance.” Dr. M. Katiyar (Co-guide).
 19. Ramanaiah Thudum, 2006, “Cyclic voltammetry studies for electrolysis of neodymium in fluoride melts.”
 20. Ramesh Kumar Nayak, 2005, “Mathematical modelling of temperature and current distribution in Hall-Heroult Cell.”
 21. Sripadmini Thamminana, 2005, “Electrodeposition of magnetic multilayers.” Dr. M. Katiyar (Co-guide).
 22. Rohit Kumar, 2005, “Numerical simulation of shaped tube electrochemical machining”
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 24. Nagaraj A., 2004, “Modelling and experiments in electrochemical systems: (1) Electrokinetic remediation of heavy metal contaminated soils, (2) Molten salt baths for electrolysis of actinides and lanthanides.” (Dr. L. M. Gantayet and Smt. Anupama P., BARC, (Co-guides).
 25. Neyaz Ahmed, 2004, “Electroremediation of Cr(VI) contaminated Kanpur soil: Bench-scale studies.”
 26. P. P. Sahoo, 2003, “Electroremediation of soil contaminated with Cr(VI): Potentiostatic Vs galvanostatic mode of operation.”
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 28. D. Pradhan, 2002, “Pulse electrodeposition of Cu-Ni multilayers from a single bath.”
 29. S. Lenka, 2002, “Physical and mathematical modeling of velocity field distribution in a simulated Hall-Heroult cell,” Dr. S. P. Mehrotra (Co-guide).
 30. R. Saraswat, 2002, “Air emissions from thermal power plants: Software development, parametric studies and averaging effects.”
 31. D. Bhunia, 2001, “Physical and mathematical modelling of current and magnetic field in simulated Hall-Heroult cell,” Dr. S. P. Mehrotra (Co-guide).
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 34. S. Sharma, 2000, “Deep hole drilling in high speed steel using electrochemical machining,” Dr. V. K. Jain (Co-guide).
 35. D. S. Sastry, 1999, “Electrostream drilling of high speed steel,” Dr. V. K. Jain (Co-guide).
 36. M. Srivastava, 1998, “Experimental Studies of magnetohydrodynamics in a laboratory scale Hall-Heroult cell,” Dr. S. P. Mehrotra (Co-guide).
 37. Renu Thakur, 1998, “Modelling of a muffle furnace used in Firozabad glass industry.”
 38. S. K. Subramanya, 1997, “Processing of alumina-zirconia composites via precipitation controlled pH conditions,” Dr. R. Tandon (Co-guide).
 39. T. Chandrashekar, 1994, “Experimental studies on solid-liquid mass transfer in Pachuca tanks,” Dr. S. P. Mehrotra (Co-guide).
 40. V. Singh, 1992, “Mathematical modelling of particle suspension in Pachuca tanks.”
 41. A. Bhattacharjee, 1992, “Mathematical modelling of electrolyte flow in advanced Hall-Heroult cells.”

Conferences/Workshops/Short-Term Courses/Reports

1. Convener, NMD-ATM 2016 conference of the Indian Institute of Metals.” Kanpur, November 11-14, 2016.
2. “Smart grid technologies for renewable energy resources,” IIT Jodhpur, April 23, 2012.
3. International workshop on “Design of sub-systems for CSP Technologies,” Jodhpur, December 19–21, 2013. Sponsored by the Asian Development Bank.
4. “Thermodynamic design of solar thermal power plants,” Five hands-on training programme, each of 5 days duration, were conducted between December 2012 and November 2013 jointly with STEAG Energy Services (India) Pvt. Ltd.
5. “Solar radiation resource assessment and modeling,” IIT Jodhpur, August 7 – 9, 2012. Organized jointly with National Renewable Energy Laboratories (NREL), USA.
6. Editor: India Infrastructure Report 2002, 3I Network, Eds. S. Morris and R. Shekhar, Oxford University Press, New Delhi.
7. Co-ordinator: Short-term course on Environmental Audit and Environmental Impact Assessment, November 13 - 17, 1995 and January 13 - 18, 1997, IIT Kanpur.
8. Co-Convenor: International Conference On Mineral Processing: Recent Advances and Future Trends, December 11 - 15, 1995, IIT Kanpur

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3. P. Chitkara, P. K. Kalra and R. Shekhar: "Preparedness of State Electricity Boards for Privatization," in *Against The Current: Organizational Restructuring Of State Electricity Boards*, Ed. J. Ruet, Manohar Publishers/Centre De Sciences Humaines, New Delhi, 2003.
4. P. Chitkara, R. Shekhar and P. K. Kalra: “Inter-state transmission of electricity: lessons from the Northern regional grid collapse,” **India Infrastructure Report 2002**, 3I Network, Eds. S. Morris and R. Shekhar, Oxford University Press, New Delhi.
5. P. Chitkara, R. Shekhar and P. K. Kalra: “Missing Interconnections in the Power Systems, **India Infrastructure Report 2001**, 3I Network, Ed. S. Morris, Oxford University Press, New Delhi, 2001, p. 94

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1. “Elephants can dance,” Times of India.