

Curriculum Vitae

Dr. Adhidesh S. Kumawat

PhD MTech BE

Email id - kumawata@nitrrkl.ac.in; adhidesh@gmail.com

Phone No. - +91 8879426336, +91 8619767220

Education

Degree/Class	Institution/Board	GPA/Percentage	Year
PhD (Chemical Engineering)	Indian Institute of Technology (IIT) Bombay	Awarded	2013-18
MTech (Chemical Engineering)	Indian Institute of Technology (IIT) Bombay	7.24/10	2011-13
BE (Chemical Engineering)	Thapar University, Patiala	8.11/10	2007-11
12 th	St. Paul's Sr. Sec. school, Udaipur (CBSE)	77	2005-06
10 th	St. Paul's Sr. Sec. school, Udaipur (CBSE)	79.8	2003-04

Experiences

- **Assistant Professor – Department of Chemical Engineering, NIT Rourkela, Rourkela, Odisha (February, 2020 – present)**
 - Teaching subjects such as Chemical Process Calculations and Fuels and Combustion
 - Faculty Advisor for M. Tech. (Energy and Environmental) – 2020 batch; B. Tech M. Tech Dual Degree – 2020 batch
- **Guest Faculty – College of Dairy & Food Science Technology, Maharana Pratap University of Agricultural Technology, Udaipur, Rajasthan (July, 2019 – Dec, 2019)**
 - Teaching core subjects such as Food Process Equipment Design and Fluid Mechanics. Also conducting labs of these subjects. Employing innovative and advanced ways of teaching methods such as teaching through presentations, group discussions, classroom projects, classroom practices and practical teaching through pilot production plants.
- **Research Associate – Chemical Engineering Department, IIT Bombay (November, 2018 – May, 2019)**
 - Conducting research on electrochemistry: (i) Simultaneous production of organic compounds by CO₂ reduction and hydrogen production in separate cells, (ii) Electro-less approach for

synthesizing nanoparticle catalyst and the electrochemical reduction process of CO₂. I have also mentored junior PhD students of the lab on their research activities.

- **Other Experiences**

- Synthesized several nanoparticles such as Cu and Pb@Cu supported over carbon. Additionally, I have assisted my lab mates in synthesis of nanoparticles such as Au and Bi@Pt.
- Performed thorough characterization of nanoparticles for both material and electrochemical properties. These characterizations help in correlating properties of nanoparticles to its catalytic activities and help in further modulating the parameter for improvement in catalysis.

- **Teaching Assistantship for bachelor level courses, labs and research facilities at IIT Bombay**

- UG Lab – Chemical Engineering, IIT Bombay (2011-2012) – Taught applications of selective ion electrode for analyzing reaction kinetics of homogeneous reaction (quinoline to 1-bromobutane) and also taught the handling and usage of electrodes. Prepared quizzes and invigilated exams for the course.
- UG Lab – Chemical Engineering, IIT Bombay (2013) – Taught Finned tube heat exchanger and the handling and usage of heat exchanger. Prepared quizzes and invigilated exams for the course.
- BET machine, Chemical engineering, IIT Bombay (2014-2016) – Carried analysis of samples for surface area analysis
- Chemical Processes course – Chemical Engineering, IIT Bombay (2016) – Evaluated quizzes and exam papers of students

Memberships and Reviewerships

- AICHE - # 009905395078
 - Electrochemical Society - # 388969
 - Reviewer – International Journal of Engineering Research & Technology - # IJERTREW4276
 - Scope Database – International Advisory Board Member (Journal Indexing and Citation Analysis)
 - Reviewer – International Journal of Research and Scientific Innovation (IJRSI)
 - Reviewer – International Journal of Research and Innovation in Applied Sciences(IJRIAS)
 - Reviewer – Springer Nature Journal
 - Reviewer – Material Science Research India Journal
 - Editorial Board Membership – American Journal of Chemical Engineering (AJCHE)
 - WASET Scientific and Technical Committee & Editorial Review Board on Chemical and Materials Engineering, 2019
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Publications

Doctoral dissertation

- **A. S. Kumawat** (2019) Preparation of catalyst for Electrochemical Reduction of CO₂ to Formic Acid

Journal articles

- S Lohar, A Vijay, B Kataria, **A. S. Kumawat**, S Bhardwaj (2021), *Visible light driven photocatalytic degradation of organic pollutant: Cleaning the environment by novel ZrCdPbO₄*, Indian Journal of Chemical Technology, Vol. 28(4), pp. 460-466, url: nopr.niscair.res.in/handle/123456789/58270.
- **A. S. Kumawat** and A. Sarkar (2019), *Electrochemical reduction of CO₂ on Pb – Bi – Sn metal mixtures – Importance of Eutectics*, SN Applied Sciences 1: 301. doi: 10.1007/s42452-019-0313-y
- **A. S. Kumawat** and A. Sarkar (2017), *Comparative study of carbon supported Pb, Bi and Sn catalysts for electroreduction of carbon dioxide in alkaline medium*, Journal of Electrochemical Society, 164 (14), H1112 – H1120. doi: 10.1149/2.0991714jes

Conference articles

- **A. S. Kumawat** (2021), *Utilization of Electrochemistry for Extracting Energy and Drinking Water from Human Urine*, Electrochemical Society Transactions, New Approaches and Advances in Electrochemical Energy Systems, No. 1, Chapter 4, Vol. 104, pp. 89. Doi: <https://doi.org/10.1149/10401.0089ecst>.
- **A. S. Kumawat** (2021), *Hybrid CO₂ Electroreduction – Associated Anodic Reactions*, Electrochemical Society Transactions, Renewable Fuels via Artificial Photosynthesis or Heterocatalysis 7, No. 10, Vol. 104, pp. 11. Doi: <https://doi.org/10.1149/10410.0011ecst>.
- **A. S. Kumawat** (2020), *Employing non – metals as catalysts for CO₂ electroreduction*, Electrochemical Society Transactions, Renewable fuels via Artificial Photosynthesis or Heterocatalysis 5 issue, Vol. 97, 699. doi: 10.1149/09707.0699ecst
- Madhusree Kundu, Ashirbad Khuntia and **A. S. Kumawat**, “Detection of pesticide using Cu-RGO modified electrochemical sensor”. Materials today: Proceedings. Vol. 62, pp. 6227 – 6231, 2022. <https://doi.org/10.1016/j.matpr.2022.05.103>.

Book-Chapters

- **A. S. Kumawat** and A. Sarkar (2020), *Synthesis of catalytically active Pb from PbS for electroreduction of CO₂ to formate in alkaline medium*, Advances in Energy Research, Vol. 1, Springer Proceedings in Energy, Springer, Singapore. doi: 978-981-15-2666-4_30

- Singuru Rajesh, G Praveen Kumar, **Adhidesh S Kumawat**, 2022, *Microbial Fuel Cell Usage in Treatment, Resource Recovery and Energy Production from Bio-refinery Wastewater*, Biorefinery for Water and Wastewater Treatment, Springer Book Chapter 20, ISBN 978-3-031-20821-8.
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Research Projects/Consultancy Undertaken

- Performance evaluation study of already installed pollution control device & pollution monitoring equipment of IMFA, Indian Metals & Ferro Alloys Limited, Cuttack, Odisha – Co-investigator
 - Treatment technology to reduce pollution load in effluent water dumping site Karni Bikaner Water Enviro Foundation, Karni Industrial Area, Bikaner, Rajasthan (334004) - Investigator
 - Quality control for performance evaluation of pollution control Monitoring devices, Jajpur cements Pvt Ltd, Jajpur, Odisha – 755019 – Co-investigator
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Seminar/Webinar Conducted

- **A. S. Kumawat** (2022), *2nd STC on Electrochemistry – Fundamentals and Applications in Engineering (EFAE-22)*, Chemical Engineering, NIT Rourela, 23 – 27 December 2022.
 - **A. S. Kumawat** and A. Mallik (2021), *3rd Short Term Course on Corrosion and its Control and Characterization*, Jointly organized by Chemical And Metallurgy & Materials Engineering, NIT Rourkela, 13 – 17 December 2021.
 - **A. S. Kumawat** (2020), *Electrochemistry-Fundamentals and its Applications in Engineering*, **1 – day** Webinar.
 - **A. S. Kumawat** (2021), *Pandemic Advance Capabilities & Engineering (PACE) Workshops, 1-Day-Virtual-Workshop*, held by AICHE.
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Conferences Attended

- **A. S. Kumawat** (2020), *Improving catalysis for CO₂ electroreduction by employing various catalyst-supports*, ECS Meeting Abstracts, MA2020-02 3253, doi: 10.1149/MA2020-02633253mtgabs
- **A. S. Kumawat** (2020), *Employing Non – Noble Metals as Catalysts for CO₂ Electroreduction*, ECS Meeting Abstracts, MA2020-01 1755, doi: 10.1149/MA2020-01391755mtgabs
- **A. S. Kumawat** (2019), *Importance of Electrochemistry and Catalysis – Progress through Carbon Footprint*, Poster presentation at **National Conference** on a Step Closer Towards Sustainable Development, Pacific Academy of higher Education and Research University, Udaipur, Rajasthan, India.

- S. Kumawat and **A. S. Kumawat** (2019), *Environmental impact of cleaner fuels in cooking*, Poster presentation at **National Conference** on a Step Closer Towards Sustainable Development, Pacific Academy of higher Education and Research University, Udaipur, Rajasthan, India.
- **A. S. Kumawat** (2019), *Employing Non-Noble metals as catalysts for CO₂ Electroreduction*, Oral presentation at **National Conference** on Pollution Control technologies and Sustainable Development, Chemical Engineering Department, MNIT Jaipur, Rajasthan, India (03 – 04 October 2019)
- Fatmia Raj and **A. S. Kumawat** (2019), *Extraction of Tannin from Bark, Leaves and Pods of Babul tree (Acacia Nilotica)*, Oral presentation at **National Conference** on Pollution Control technologies and Sustainable Development, Chemical Engineering Department, MNIT Jaipur, Rajasthan, India (03 – 04 October 2019)
- Khushal Borana, Satyaveer Yadav and **A. S. Kumawat** (2019), *Accoustic Technology: Improvising Processed Food Industry*, Oral presentation at **National Conference** on Pollution Control technologies and Sustainable Development, Chemical Engineering Department, MNIT Jaipur, Rajasthan, India (03 – 04 October 2019)
- **A. S. Kumawat** (2019), *Employing of non – noble metals for designing electrocatalyst and converting CO₂ into fuels*, Poster presentation at **National Conference** on Green Chemistry for Clean Environment, RSC London (North-India section) & Green Chemistry Network, Delhi and Department of Chemistry, J. R. N. Rajasthan Vidyapeeth, Udaipur, Rajasthan, India
- S. Kumawat and **A. S. Kumawat** (2019), *Combating Global Warming – role of a Housewife by Household Farming*, Poster presentation at **National Conference** on Green Chemistry for Clean Environment, RSC London (North-India section) & Green Chemistry Network, Delhi and Department of Chemistry, J. R. N. Rajasthan Vidyapeeth, Udaipur, Rajasthan, India
- **A. S. Kumawat** and A. Sarkar (2017), *Synthesis of catalytically active Pb from PbS for Electroreduction of CO₂ to Formate in alkaline medium*, Oral presentation at **International Conference - ICAER-2017**, Mumbai.
- **A. S. Kumawat** and A. Sarkar (2016), *Carbon Dioxide to Formic Acid – Electrocatalyst Development and Characterization*, Poster presentation at **International Conference - iSAEST-2016**, Chennai.
- **A. S. Kumawat** and A. Sarkar (2016), *Development of Electrocatalyst for electroreduction of CO₂ to HCOOH*, Poster presentation at **National Conference - NCE-19**, NIT-Trichy.
- **A. S. Kumawat** and A. Sarkar (2016), *Development of Electrocatalyst for electroreduction of Carbon Dioxide to Formic Acid*, Oral presentation at **National Conference - RSS-2016**, IIT Bombay, Mumbai

Resource Person

- **A. S. Kumawat** (2022), **Invited Talk**, *Initiatives in Energy Conservation and their Impact*, The Institution of Engineers India – Rourkela chapter, on the occasion of Energy Conservation Day, 14th December 2022.

- **A. S. Kumawat** (2022), **Resource Person**, *Carbon Dioxide Utilization – Prospects and Techniques*, Advances in Carbon Capture & Utilization for Sustainable Climate (04 – 10 July 2022), Faculty Development Program.
 - **A. S. Kumawat** (2020), **TEQIP-III Resource Person**, *Electrocatalysis – Environmental applications to reduce CO₂*, Recent Advances on Nanotechnology, Catalysis & Bio-Chemical Engineering (RANCBE – 2020), VSSUT, Burla, Odisha (16 – 20 September 2020), Faculty Development Program.
 - **A. S. Kumawat** (2022), **Invited Talk**, *Energy Conservation, Sustainable Development and Environment Protection through Electrochemistry*, The Institution of Engineers India – Rourkela chapter, on the occasion of Energy Conservation Day, 14th December 2022.
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Books

- Dr. Sarita Kumawat and **Dr. A. S. Kumawat**, *Textiles and Laundry*, Udaipur, Rajasthan, India, Suresh book service, 2022, ISBN: 978-93-93859-00-6.
 - Dr. Sarita Kumawat and **Dr. A. S. Kumawat**, *Food and Nutrition*, Udaipur, Rajasthan, India, Suresh book service, 2022, ISBN: 978-93-93859-00-6.
 - Dr. Sarita Kumawat and **Dr. A. S. Kumawat**, *Human Physiology*, Udaipur, Rajasthan, India, Suresh book service, 2022, ISBN: 978-93-93859-22-6.
 - Dr. Sarita Kumawat and **Dr. A. S. Kumawat**, *First Aid and Home Nursing*, Udaipur, Rajasthan, India, Suresh book service, 2022, ISBN: 978-93-93859-00-6
 - Dr. Sarita Kumawat and **Dr. A. S. Kumawat**, *Food and Nutrition (आहार एवं पोषण विज्ञान)*, Udaipur, Rajasthan, India, Suresh book service, 2020, ISBN: 978-93-8505-314-6.
 - Dr. Sarita Kumawat and **Dr. A. S. Kumawat**, *Textile and Laundry (वस्त्र विज्ञान एवं धुलाई कला)*, Udaipur, Rajasthan, India, Suresh book service, 2020, ISBN: 978-93-8505-315-8.
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Faculty Development Programs

- **A. S. Kumawat** (2022), **Resource Person**, *Carbon Dioxide Utilization – Prospects and Techniques*, Advances in Carbon Capture & Utilization for Sustainable Climate (04 – 10 July 2022)
- **A. S. Kumawat** (2021), *Waste to Bioenergy: A Sustainable Solution*, Five-day faculty Development Program, Organized by Department of Biotechnology, NIT Andhra Pradesh (13 – 17 September 2021).
- **A. S. Kumawat** (2021), *Emerging trends for Developing Vocational Aptitude in Home Science*, Gyan Ganga – Online Short Term training Program, Jointly organized by Commissionerate, College Education, Rajasthan & Department of Home Science, Govt. Meera Girls College, Udaipur (15 – 20 February 2021).

- **A. S. Kumawat** (2021), *Sensors technology*, AICTE training and Learning (ATAL) Academy, North-Eastern Hill University (8 – 12 February 2021).
- **A. S. Kumawat** (2020), **TEQIP-III Resource Person**, *Electrocatalysis – Environmental applications to reduce CO₂*, Recent Advances on Nanotechnology, Catalysis & Bio-Chemical Engineering (RANCBE – 2020), VSSUT, Burla, Odisha (16 – 20 September 2020).
- **A. S. Kumawat** (2020), *Participant*, Catalysis & Bio-Chemical Engineering (RANCBE – 2020), VSSUT, Burla, Odisha (16 – 20 September 2020).
- **A. S. Kumawat** (2019), *Motivating students through Doubt Solving using Modern Technology*, International Seminar on Developing Faculty Profile, Organized by and held at Department of Management Studies and Department of Mechanical Engineering, GITS, Udaipur, India.
- **A. S. Kumawat** (2015), *Advanced TEM Techniques*, SAIF – CRNTS, IIT Bombay (25 – 26 February 2015).

Workshops and Seminars

- K Yesu Ramya, **A. S. Kumawat**, (2022,) *A mini review on the catalytic technology developments for the mitigation of various air pollutants*, Proceedings of 75th Annual Session of Indian Institute of Chemical Engineers, CHEMCON 2022, 27th -30st December, Kanpur, India. **(BEST POSTER AWARD)**
- Singuru Rajesh, **A. S. Kumawat**, (2021), *Microbial Fuel Cell with Agro-Residue Substrates - An alternate to Stubble Burning*, Proceedings of 74th Annual Session of Indian Institute of Chemical Engineers, CHEMCON 2021, 27th -30st December, Bhubaneswar, India. **(BEST POSTER AWARD)**
- Singuru Rajesh, **A. S. Kumawat**, Yenda Keerthi, (2022), *Additive Manufacturing in Agriculture: A Sustainable Agro-Residue Management with a case study*, Proceedings of Int. Conf. on Key Enabling Technologies for Sustainable Agri-Food Chain KETSAC-2022, 9th-11th December 2022, NIT Rourkela, Odisha, India.
- Singuru Rajesh, **A. S. Kumawat** (2022), *Additive manufacturing approaches in electrochemistry – a review*, Advances in Smart Materials, Chemical & Biochemical Engineering (CHEMSMART-22) conference, Department of Chemical Engineering, NIT Rourkela, December 16 – 18, 2022.
- TEQIP-III sponsored 3 day online workshop on “Experimental methods in analytical electrochemistry and advanced chemical engineering”, Nov. 23 – 25, 2020, Department of Chemical engineering, Ujjain Engineering college, Ujjain.
- **Invited Talk** – A seminar on “Energy Conservation, Sustainable Development and Environment Protection through Electrochemistry” at The Institution of Engineers India – Rourkela chapter on 14th Dec. 2020 in regard to “Energy Conservation Day”.
- **Conducted** – “Electrochemistry –Fundamentals and Applications in Engineering”, A one day webinar sponsored by SRICCE, NIT Rourkela on 14th Oct. 2020.

- **A. S. Kumawat** (2019), *Green Chemistry and Use of Technical Language in Hindi Language: Need of Present time* (हरित रसायन एवं वैज्ञानिक तथा तकनीकी शब्दावली: आज की आवश्यकता), Workshop Organized by Commission for Scientific and technical Terminology, Ministry of Human Resource Development and Department of Higher Education; held at PAHER University Udaipur, India (03 – 04 November 2019).
 - **A. S. Kumawat** (2019), *Motivating students through Doubt Solving using Modern Technology*, International Seminar on Developing Faculty Profile, Organized by and held at Department of Management Studies and Department of Mechanical Engineering, GITS, Udaipur, India.
 - **A. S. Kumawat** (2015), *Advanced TEM Techniques*, SAIF – CRNTS, IIT Bombay (25 – 26 February 2015).
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Students Guided

- **Biplove Singh**, *Hydrogen evolution reactions*, B. Tech. project (UG), 2020-21.
 - **Rahul Kumar Singh**, *Electrolytic reduction of CO₂*, B. Tech. project (UG), 2020-21.
 - **Aditya Narayan Swain**, *Performance Analysis of a Proton Exchange Membrane Fuel Cell : A Simulation Study*, B, Tech project (UG), 2021-22.
 - **Manchoju Makarand**, *Study of energy storage in batteries*, B.Tech.-M. Tech. Dual Degree, 2021-22.
 - **Sairamana N**, *Development of electrode material from the organic waste for the application of energy storage*, M. Tech. project, 2021-22.
 - **Pratik Vikas Wangikar**, *Development of electrode using Orange peel for Lithium Carbon Dioxide battery*, M. Tech. project, 2021-22.
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Projects

- **Electroless approach for the electrochemical reduction of CO₂** (November, 2018 – May, 2019)
(Advisor: Prof. Arindam Sarkar, IIT Bombay)
 - Aimed towards electrochemically reducing CO₂ without employing a potentiostat
 - Currently investigating ideal conditions and parameters for product formation
- **Simultaneous production of organic compounds by CO₂ reduction and production of hydrogen by H₂O reduction in separate cells** (November, 2018 – May, 2019)
(Advisor: Prof. Arindam Sarkar, IIT Bombay)
 - Designing electrochemical cell for simultaneous capture of hydrogen and CO₂ reduction products

- Currently investigating ideal conditions and parameters for product formation
 - **Synergistic effect of metal mixture catalysts for electroreduction of CO₂ to formic acid** (*July, 2017 – May, 2018*)
(Advisor: Prof. Arindam Sarkar, IIT Bombay)
 - Prepared metal mixture ternary alloys of Pb, Bi and Sn
 - Investigated and compared catalysts' performance based on identical conditions and parameters
 - Results demonstrated that eutectic compositions perform better than other ternary compositions of Pb – Bi – Sn alloy system
 - **Effect of various catalyst support materials on electroreduction performance for CO₂ to formic acid** (*November, 2016 – June, 2017*)
(Advisor: Prof. Arindam Sarkar, IIT Bombay)
 - Synthesized Pb supported catalysts on various supports such as C, CeO₂, TiO₂, ZrO₂ and Y₂O₃.
 - Investigated and compared catalysts' performance based on identical conditions and parameters
 - **Alternative synthesis method for CO₂ electroreduction active nano-catalyst** (*June, 2016 – November, 2016*)
(Advisor: Prof. Arindam Sarkar, IIT Bombay)
 - Synthesized active Pb nanocatalyst by in-situ reducing PbS nanoparticles
 - **Electroreduction of CO₂ to formic acid by synthesizing nanoparticles of Pb, Bi and Sn** (*January, 2015 – May, 2016*)
(Advisor: Prof. Arindam Sarkar, IIT Bombay)
 - Synthesized catalyst nanoparticles of Pb, Bi and Sn and utilized them as gas diffusion electrode
 - **Breakdown Voltage of lipid bilayer at varying frequencies and Multilamellar Vesicle (MLV) formation techniques** (*January 2012 – December 2012*)
(Advisor: Prof. Rochish Thaokar, Indian Institute of Technology Bombay)
 - Synthesized and replicated a lipid bilayer by using soy lecithin in order to determine its breakdown voltage.
 - Voltage was applied across the bilayer utilizing an in-house made apparatus
 - Breakdown voltage was found to increase with increasing frequency of applied voltage
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Internships

- **Industrial Beneficiation Plant, Rajasthan State Mines and Minerals, Udaipur, Rajasthan** (*July, 2010 – December, 2010*)
(Advisor: Prof. D. Gangacharyulu, Mr. Naveen Dalal and Mr. Abdul Manan)
 - Worked on floatation of low-grade phosphate ore using alternate reagents
- **Hindustan Zinc Limited, Udaipur, Rajasthan** (*June 2009 – July 2009*)
 - Worked towards achieving 2.8% Zinc content for recovery in Jaorsite

- This project helped in process improvement for reducing zinc wastage in the residual material
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Achievements

Academic

- Singuru Rajesh (521CH1004), PhD selected for the **Swachhta Saarthi Fellowship Cohort 2022**, under category B, in “**Waste to Wealth**” which was monitored under *The Office of the Principal Scientific Adviser to the Government of India*.
- Scored A grades in Engineering Thermodynamics, Chemical Engineering Thermodynamics, Material Science and Engineering, Organic Chemistry courses during BE at Thapar University
- Secured AIR 75 in GATE 2010 (Chemical Engineering)
- Held post of Joint Convener – ACID society, chemical engineering, Thapar University

Sports

- Won second place in 50 meters breaststroke at Faculty swimming event of NIT Rourkela (Feb. 2022)
- Won fourth place in 50 meters backstroke at PG swimming event of IIT Bombay (2011)
- Special achievement award for swimming (2001) – St. Paul’s Sr. Sec. School, Udaipur (Rajasthan)
- National level swimmer at school and open level competitions (1999 – 2000)

Other

- Performed at Performing Arts Festival of IIT Bombay in Drama acting – IIT Bombay (2012)
 - Performed at PG Drama competition – IIT Bombay (2011)
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Technical Skills

- Equipments: High Pressure Liquid Chromatography (HPLC), Gas Chromatography (GC), Potentiostat (Biologic Science Instruments, Gamry Instruments, CH Instruments) and Mechanical roller press
 - Programming languages: MATLAB, OriginPro, Fityk, X’Pert HighScore, XPSPeak, Autodesk, SketchUp, Smartdraw, Edraw, Thermo-Calc, ESCApe, LabView and C
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Others

- Member of Organizing committee at Technology Club at NIT Rourkela (2021 – 22)
 - Faculty Advisor Appreciation Award, Academic Session 2021 – 2022, NIT Rourkela
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