Curriculum Vitae

Dr. Adhidesh S. Kumawat

PhD MTech BE

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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)**
- **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 CO_2 reduction and hydrogen production in separate cells, (ii) Electro-less approach for synthesizing nanoparticle catalyst and the electrochemical reduction process of CO_2. 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

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Publications

Doctoral dissertation

- **A. S. Kumawat** (2019) Preparation of catalyst for Electrochemical Reduction of CO_2 to Formic Acid

Journal articles

- **A. S. Kumawat** and A. Sarkar (2019), *Electrochemical reduction of CO_2 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 (2019), *Synthesis of catalytically active Pb from PbS for electroreduction of CO_2 to formate in alkaline medium*, Springer Proceedings in Energy *(Manuscript accepted)*
- **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

Conferences

- **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 CO_2 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 CO_2 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 CO_2 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 CO_2 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

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Books

- 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.

Workshops and Seminars

- **A. S. Kumawat** (2019), *Green Chemistry and Use of Technical Language in Hindi Language: Need of Present time* (हरित रसायन एवं वैज्ञानिक तथा तकनिकी 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).

Projects

- **Electroless approach for the electrochemical reduction of CO_2** *(November, 2018 – May, 2019)*
  (Advisor: Prof. Arindam Sarkar, IIT Bombay)
  - Aimed towards electrochemically reducing CO_2 without employing a potentiostat
  - Currently investigating ideal conditions and parameters for product formation
- **Simultaneous production of organic compounds by CO_2 reduction and production of hydrogen by H_2O reduction in separate cells** *(November, 2018 – May, 2019)*
  (Advisor: Prof. Arindam Sarkar, IIT Bombay)
  - Designing electrochemical cell for simultaneous capture of hydrogen and CO_2 reduction products
  - Currently investigating ideal conditions and parameters for product formation
- **Synergistic effect of metal mixture catalysts for electroreduction of CO_2 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 CO_2 to formic acid** *(November, 2016 – June, 2017)*
  (Advisor: Prof. Arindam Sarkar, IIT Bombay)
  - Synthesized Pb supported catalysts on various supports such as C, CeO_2, TiO_2, ZrO_2 and Y_2O_3.
  - Investigated and compared catalysts' performance based on identical conditions and parameters
- **Alternative synthesis method for CO_2 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 CO_2 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

- Scored AB grade in Experiment Methods course during MTech at IIT Bombay
- Scored A grades in Thermodynamics, Chemical Engineering Thermodynamics, Material Science and Engineering, Organic Chemistry courses during BE at Thapar University
- Secured AIR 75 in GATE 2010 (Chemical Engineering)
- Joint Convener for ACID society of chemical engineering at Thapar University

Sports

- 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)

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
