

# Bhanupriya Boruah

Ph.D. Candidate, Indian Institute of Science, Bangalore | Exchange Scholar, Nanyang Technological University, Singapore  
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## EXECUTIVE SUMMARY:

- Ph.D. candidate with experience in synthesis and characterization of heterogeneous catalysts and their application in photocatalytic/ electrochemical biomass conversion, hydrogen production, and water remediation from pollutants and pathogens
- Led innovative projects in a collaborative team environment resulting in 7 research articles published in high-impact journals, 1 article in review, and 3 manuscripts in preparation

## EDUCATION:

**Ph.D., Chemical Engineering** (August 2016 - Present, Expected graduation: July 2021)

Indian Institute of Science (IISc), Bangalore, India, *Advisor: Prof. Jayant M. Modak*

**Dissertation Title:** “Development of visible active photocatalysts for water remediation from pathogens and phenolics.”

**Ph.D. Exchange Student** (June 2019- Present)

Nanyang Technological University (NTU), Singapore, *Advisor: Prof. Soo Han Sen*

**Project Title:** “Development of photoelectrodes for biomass conversion to fuels and hydrogen generation from seawater.”

**Master of Science, Chemical Engineering** (May 2015)

Indian Institute of Technology, Madras (IITM), Chennai, India, *Advisor: Prof. R. Vinu*

**Dissertation Title:** “Conversion of lignin into value added products by photocatalysis.”

**Bachelor of Technology, Chemical Engineering** (May 2013)

National Institute of Technology Karnataka (NITK), Surathkal, India

## RESEARCH EXPERIENCE:

**Graduate Research Associate, IISc, PI: Prof. Jayant M. Modak** (August 2016 – Present)

- **Visible active photocatalysts for water remediation from pathogens and phenolics:** Synthesized and characterized doped metal oxide and Z scheme heterojunction photocatalysts, and applied for catalytic removal of organic pollutants from water
- **Photocatalyst nanoparticles immobilized on a polymeric support:** Design systems to immobilize or strongly couple visible active photocatalysts on a polymeric support to serve as ultrafiltration membranes that remove and remediate pathogenic bacteria, phenolics, colloidal impurities, foulant proteins from water sources

**Exchange Research Scholar, Innovated photosynthesis lab, NTU, PI: Prof. Soo Han Sen** (June 2019 – Present)

• **Development of Photoelectrochemical Cells for Upcycling Plastics and Biomass into Fuels:**

- Develop hybrid photoanodes to oxidize the plastics and biomass.
- Develop suitable cathodes to selectively and cost-effectively produce hydrogen gas or syngas.
- Integration of these components into a photoelectrochemical cell.

**Graduate Research Assistant and Project Officer, IITM, PI: Prof. R. Vinu and Prof. Sai P.S.T.** (August 2013-July 2016)

- Microwave assisted co-pyrolysis of biomass with polypropylene and polystyrene for high quality bio-oil production
- Photocatalytic conversion of lignin to phenolic compounds using TiO<sub>2</sub> nanoparticles
- Studies on Adsorption of various dyes on eggshell membrane and chitosan

**Undergraduate Research, NITK, PI: Prof. Vidya Shetty K.** (2011-2013)

- Photocatalytic degradation of acid yellow-17 dye using TiO<sub>2</sub> nanoparticles immobilized on cellulose acetate and chitosan in a fluidized bed reactor

## AWARDS AND HONORS:

- Selected for the International Internship Program to carry out research at the School of Physical and Mathematical Sciences, NTU for six months (July 2020)
- Recipient of Kris Gopalakrishnan fellowship for a Joint PhD Supervision Program between IISc and NTU (June 2019)
- Kumar Gandhi award for best oral presentation at Chemical Engineering In-house Symposium, IISc (May 2019)
- Young investigator award for best oral presentation at School on Advanced Oxidation Processes, BITS Goa (Nov 2018)
- Kumar Gandhi award for best poster presentation at Chemical Engineering In-house Symposium, IISc (April 2018)

## TECHNICAL SKILLS:

- **Catalyst Synthesis:** Experienced with synthesizing metal oxide catalysts using sol-gel and combustion synthesis methods, synthesis of mixed metal oxide catalysts using hydrothermal route and electrodeposition technique to develop electrodes
- **Catalyst characterization:** Hands on experience with XRD, XPS, Ultraviolet Photoelectron Spectroscopy, Diffused Reflectance Spectroscopy, Photoluminescence Spectroscopy, Time Resolved Fluorescence Spectroscopy, SEM, TEM, and BET surface area measurements
- **Analytical techniques:** Hands on experience with GCMS, LCMS, HPLC, NMR, ICP-MS

## CONFERENCE PRESENTATIONS:

- **B Boruah**, R Gupta, J M Modak, G Madras, Enhanced Photocatalysis and Bacterio-inhibition in Nb<sub>2</sub>O<sub>5</sub> via versatile doping of Metal (Sr, Y, Zr, Ag), In-house symposium, IISc (2019)
- **B Boruah**, R Gupta, J M Modak, G Madras, Novel insights into the properties of AgBiO<sub>3</sub> photocatalyst and its application in immobilized state for 4-nitrophenol degradation and bacteria inactivation, School on Advanced Oxidation Processes, Birla Institute of Technology and Science, Goa (2018)
- **B Boruah**, R Vinu, Photocatalytic conversion of lignin into value fuels, Research Scholar Day, IITM (2016)

## PUBLICATIONS: Google Scholar Link: <https://scholar.google.com/citations?user=oZfttBQAAAAJ&hl=en&oi=ao>

- **B. Boruah**, P.K. Samantaray, G. Madras, J.M. Modak, S. Bose, Sustainable photocatalytic water remediation via dual active strongly coupled AgBiO<sub>3</sub> on PVDF/PBSA membranes, Chemical Engineering Journal (2020) 124777.
- A.Y. Ru Ng, **B. Boruah**, K.F. Chin, J.M. Modak, H.S. Soo, Photoelectrochemical cells for artificial photosynthesis: alternatives to water oxidation, ChemNanoMat (2020)
- **B. Boruah**, R. Gupta, J.M. Modak, G. Madras, Enhanced photocatalysis and bacterio-inhibition in Nb<sub>2</sub>O<sub>5</sub> via versatile doping of metal (Sr, Y, Zr, Ag): A critical assessment, Nanoscale Advances, 1 (2019) 2748-2760.
- **B. Boruah**, R. Gupta, J.M. Modak, G. Madras, Novel insights into the properties of AgBiO<sub>3</sub> photocatalyst and its application in immobilized state for 4-Nitrophenol degradation and bacteria inactivation, Journal of Photochemistry and Photobiology A: Chemistry, 373 (2018) 105-115.
- R. Gupta, **B. Boruah**, J.M. Modak, G. Madras, Kinetic study of Z-scheme C<sub>3</sub>N<sub>4</sub>/CuWO<sub>4</sub> photocatalyst towards solar light inactivation of mixed populated bacteria, Journal of Photochemistry and Photobiology A: Chemistry, 372 (2019) 108-121.
- D.V. Suriapparao, **B. Boruah**, D. Raja, R. Vinu, Microwave assisted co-pyrolysis of biomasses with polypropylene and polystyrene for high quality bio-oil production, Fuel Processing Technology, 175 (2018) 64-75.
- C. Gadiyar, **B. Boruah**, C. Mascarenhas, V. Shetty, Immobilized nano TiO<sub>2</sub> for photocatalysis of acid yellow-17 dye in fluidized bed reactor, International Journal of Current Engineering and Technology, (2013) 2277-4106.
- **B. Boruah**, J.M. Modak, Giridhar Madras, Construction of a Z-scheme Ag<sub>2</sub>S-In<sub>2</sub>S<sub>3</sub> structure: Towards Enhanced Photodegradation and Bactericidal Activity, Nanoscale Advances, Under review
- **B. Boruah**, Zhao Xin, J.M. Modak, H.S. Soo, Simultaneous generation of hydrogen from seawater and biomass conversion to fuel by photoelectrocatalysis. In preparation
- X Zhao, **B. Boruah**, J.M. Modak, H.S. Soo, Development of photoelectrochemical cells for upcycling plastics into fuels with solar energy, In preparation
- X Zhao, **B. Boruah**, K F Chin, M Dokic, J.M. Modak, H.S. Soo, Sustainable materials research in Singapore: Conversion of plastic waste to valuable chemicals, Advanced Materials, In preparation

## LEADERSHIP, PROFESSIONAL INVOLVEMENT AND COMMUNITY OUTREACH:

- One of the 25 candidates selected to participate in *Falling Lab*, Singapore (2019)
- Worked as a Graduate Teaching Associate with Prof. K. Kesava Rao for postgraduate CH 244- Treatment of Drinking Water, held additional classes, office hours, drafted exam problems and graded exams (2018)
- Active participation in "*Open Day*", an annual event organized by IISc to showcase research activities to the general public in the form of experimental demo, exhibition and poster presentation to motivate school students to pursue STEM (2017-2019)
- Joint Secretary, Chemical Engineering Association, IISc (2017)
- Member of counselling team, IIT Madras (2014)
- Executive member of Workshops committee in Engineer, the annual technical festival of NITK (2012)
- Active participation in debate competitions in college and school. Delivered speech to the Chief Minister of Assam during the Gnanjyoti Program, an initiative to foster cultural harmony and education among high school students (2008)