

JULIE BORAH

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EDUCATIONAL QUALIFICATION

Degree	Institution	Percentage/CGPA
Doctor of Philosophy (Chemical engineering)	Indian Institute of Technology Delhi	2018-Present (TCS fellowship awardee)
M.Tech (Material Science & Nanotechnology)	DCRUST	CGPA 8.83 (2016) Gold medalist of the university
B.Tech (Electronics & Communication)	Rajasthan Technical University	77.4% (Honours, College topper)
12 th (PCM) AHSEC	Cotton College, Guwahati	70.8%
10 th (SEBA)	Don Bosco Higher Secondary School	82% (Star Marks)

RESEARCH INTERESTS

My primary research interest is in the field of molecular dynamics simulation, multi-scale modeling, ab-initio techniques, DFT, CPMD, energy storage devices, supercapacitors, force field development, polymers, conductive materials, nanomaterials, and ionic liquids.

CURRENT POSITION

Ph.D. Scholar

Chemical Engineering, Indian Institute of Technology, Delhi

Advisor: Prof. Gaurav Goel

Title: Design and characterization of polymer nanocomposite system for energy storage systems.

My work is focused on investigating the charge storage mechanism in supercapacitors using molecular dynamic simulation. It involves studying the microstructure at the interface of graphene/polyaniline electrode and EMIBF₄ (room temperature ionic liquid) as electrolyte. My work also entails, finding suitable force field parameters for emeraldine base (polyaniline) for the OPLS force field using DFT. The research is being funded by **TCS (TCS research scholar Cycle-14)**.

MASTER'S THESIS

Title: Banana-derived biochar as electrode material for environment-friendly supercapacitor.

Supervisor: Prof. Ashok Sharma and Co-supervisor: Prof. Surender Duhan

In this work, the electrode material for supercapacitors was successfully obtained from biochar derived from bananas. The specific capacitance of the biochar prepared was characterized by cyclic voltammogram (CV technique) and tested in acidic, alkaline, and neutral electrolytes.

ACADEMIC PROJECTS

- **Project 1.** Dipole moment calculations of HEPES and PIPES: Calculations for dipole moment of HEPES and PIPES molecules were done using DFT for the paper: Zwitterions for impedance spectroscopy: The new buffers in town.

- **Project 2.** Generation of electricity using a piezoelectric crystal: The objective of this project is to convert pressure created by human footsteps into electricity using piezoelectric crystals.
- **Project 3.** Cut wire detector: The objective of this project is to detect a break in the wire without peeling off the insulator.
- **Project 4.** Heartbeat monitoring system: The objective of this project is to detect human heartbeat rate and body temperature.

SKILLS SET

- **Computing Skills:** Gromacs, Material Studio, Multiwfn for analyzing data, Orca for DFT, CPMD, Origin, Shell, Python, Knowledgeable in energy market modeling principles and optimization techniques and Microsoft Office tools.
- **Laboratory Skills:** Proficient in using electrochemical potentiostat auto lab, autoclave, reading and analyzing data of SEM, TEM, UV-VIS spectroscopy, XRD, and FTIR.
- **Teaching/Mentoring Skills:** I have mentored the project/thesis work of a few B.Tech and M.Tech students.
- **Soft skills:**
 - Ability to work independently (initiated the research work for the first time in the lab).
 - Ability to work on multiple projects in parallel (for long hours).
 - Ability to logically comprehend a large amount of data.
 - Focused, organized, and good technical communication.
 - Critical thinking
 - Acute sense of observation
 - Languages: English, Hindi, and Assamese.

NATIONAL AND INTERNATIONAL CONFERENCES ATTENDED

- Presented a poster on NANO 2020 held at IIT Delhi - Industry Interface on 5th Feb. 2020.
- Presented a poster at the International Conference SMST-2020 held at Goa from Feb 22-25th 2020.
- Participated in the International Virtual Conference on Advanced Nanomaterials Applications (VCAN-2020) from 17th to 19th June.
- Presented a poster in ICES-2023 held at IIT-Madras on 17th-20th January 2023.
- Attended the India-Japan bilateral conference of Science, BICON, 2015 held at Jaipur, India
- Delivered an oral presentation at the international multidisciplinary conference, INAAR, 2016, Delhi
- Presented a poster at the national conference of physics, 2016, DCRUST, Haryana
- Presented a poster at the national conference on the role of science and Technology, Bhiwani, 2016

PUBLICATIONS UNDER PREPARATION

- Force field parameterization and validation of PANi-EB in OPLS for energy storage applications.
- Force field parameterization, doping, and interaction of polyaniline with graphene.
- Specific capacitance calculations in Graphene/Polyaniline/ionic liquid system
- Debye length calculation in Graphene/KCL system.

PUBLICATIONS PUBLISHED

- 'Bispidine as a β -strand nucleator: from a β -arch to self-assembled cages and vesicles' Chemical Science (2021), H.Singh, A. Chenna, U.Gangwar, Julie Borah, G.Goel and V. Haridas.
- A study on the smart structure and various types of smart materials, at the national conference on the role of science and technology, Bhiwani, 2016
- Organo-electronic materials for energy storage applications, at the national conference on the role of science and technology, Bhiwani, 2016.

ACHIEVEMENTS

- TCS fellowship awardee during Ph.D. (TCS cycle 14)
- Gold medalist of the university during Masters (Haryana state university) awarded by the Governor of Haryana.
- GATE 2014 Qualified and was awarded the GATE scholarship by MHRD, GOI.
- UGC-NET (qualified for the post-Asst. Prof. 2015) qualified in Electronics Science.
- Awarded Anundaram Barooah award by the STATE GOVT. OF ASSAM for academic excellence in board exams.
- Prize for academic excellence consecutively in B TECH 2nd, 3rd, and 4th year.
- Awarded by the Diphu Club of Lions Greater for being in the top 10 merit list in the district in the board exam.

EXTRACURRICULAR ACTIVITIES

- Delivered a talk in the TCS research cafe session.
- Associated with animal rescuing groups.
- Anchored National science day, and Republic day in the university.
- I love collecting rare plants mostly Aroids (1500+plants at home).
- 1st Prize in a multi talent show at inter school competition.