Vedant Subhash Phad

Roll No.:210122064
B.Tech - Chemical Science and Technology
Minor in Biosciences and Bioengineering
Indian Institute Of Technology, Guwahati

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Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
B.Tech. Major	Indian Institute of Technology, Guwahati	8.2 (Current)	2021-Present
B.Tech. Minor	Indian Institute of Technology, Guwahati	8.8 (Current)	2022-Present
Senior Secondary	Maharashtra State Board	96.33%	2021
Secondary	ICSE Board	96.2%	2019

Experience

- **Computational Material Science and Biomaterials Lab** *Feb. 2024 - present*
  Supervisor: Dr. Debdas Dhabal Department of Chemistry, IIT Guwahati
  – Calculated contact angle of water droplet and Diiodomethane droplet on chemically modified surfaces using MD simulations with the objective to enhance hydrogen evolution reaction(HER). *(Co-PI - Dr. Uttam Manna)*
  – Performed MD simulations on peri-Napthoisatogen (active component in the application of fluorescence thermometers) substituted with long alkyl chains in THF and water solvent system using **Gromacs**. The simulations results explained the supramolecular interactions and aggregate formation. *(Co-PI - Dr. Kingsuk Mahata)*
  – Validated the performance of ML-BOP coarse-grained model to simulate high-pressure ice phases using, analyzing its accuracy in reproducing thermodynamic and structural properties compared to experimental data.

Publications

- **Vedant Phad**, Farhat, Z., Prasad, A. and Kumar, S.* (2024). **Newer approaches for viral vaccine development.** In *Bioreactor Design Concepts for Viral Vaccine Production* (pp. 389-399). Academic Press. (**ISBN: 9780443153785**)
- **Vedant Phad** and Dhabal, D.*, **Optimizing the Diiodomethane Model for Accurate Simulations and Experimental Exploration Beyond Laboratory Limits** (under preparation).
- Das, J., **Vedant Phad**, Dhabal, D*. and Manna, U.* **Designing Superaerophobic Surfaces through Computational Study of Surface Free Energy for Enhanced Hydrogen Evolution Reaction Efficiency** (under preparation).
- Debnath, I., **Vedant Phad**, Dhabal, D.* and Mahata, K.* **Exploring Supramolecular Interactions and Aggregate Formation of peri-Naphthoisatogen Using Molecular Dynamic Simulations** (under preparation).
- **Vedant Phad** and Dhabal, D.*, **On the Accuracy of ML-BOP Model in Reproducing the Properties of High-Pressure Ices** (under preparation).

Projects

- **Immunology and Microbiology Lab-Virtual Labs** *Feb. 2023 - Jan. 2024*
  Dr. Sachin Kumar/Virtual Labs/Ministry of Education www.iitg.ac.in/cseweb/vlab/Bioscience/
  Performed the following experiments and analyzed the results.
  – Flow Cytometry of immune cells.
  – Determination of MIC(minimum inhibitory concentration) of an antibiotic.
  – Cloning and expression of GFP sequence/gene in the expression vector.
  Documented the experimental procedures and uploaded the data on the webpage.

- **Drug dose optimization for chemotherapy** *Nov. 2023*
  Course project under the supervision of Dr. Prakash Kotecha github.com/vedantphad/
  – Developed an multi-objective optimization scheme for single-drug chemotherapy using **GAMS**.
  – Implemented tumor mathematical model involving ODEs simulating cell dynamics in the presence of drug.
  – Applied **MINLP** formulation for minimizing drug dose.
  – Applied **NLP** formulation for minimizing tumor cell count.

Conferences attended

- **FICS (Frontiers in Chemical Sciences)** *Dec. 2024*
  Department of Chemistry, IIT Guwahati
  – Presented a poster on my work on "On the Accuracy of ML-BOP Model in Reproducing the Properties of High-Pressure Ices".
  – I addressed ML-BOP's computational efficiency and its ability to reproduce key properties of high-pressure ices while identifying areas for further improvement, such as limitations in lattice energy predictions.

Technical Skills

- **Molecular Docking softwares**: Pymol, AutoDock Vina
- **MD simulation softwares**: VMD, Gromacs, LAMMPS*
- **Processes studied**: Gel Electrophoresis, Western Blotting, PCR, MIC Assay
- **Design**: BioRender, Canva, Microsoft Powerpoint
- **Operating Systems**: Linux, Windows
- **Documentation Softwares**: Microsoft Word, EndNote
- **Miscellaneous**: Fortran, MATLAB*, Latex*

** Elementary proficiency*

Key courses taken

- **Chemistry**: Introduction to Quantum Chemistry, Group Theory, Application of Nanomaterials, Computational Chemistry, Polymer Chemistry, Medicinal Chemistry, Spectroscopic techniques, Drug discovery and development
- **Laboratory courses**:
  - **Organic Laboratory:** Synthesis of Aspirin, Dibenzylideneacetone, Thiokol rubber, Nylon-6,6, NaBH4 reduction; purification of synthesised compounds using column chromatography; characterisation by NMR, IR, melting point
  - **Inorganic Laboratory:** Separation of toxic metal ions (Cu2+, Ca2+) from water; Synthesizing ZnO nanoparticles and calculating band-gap; Estimating strength of Bleaching Powder; Estimating CaO in Portland Cement; Estimating Phosphate content in cola; Standardization of disinfectants (KMnO4, Potash Alum)
  - **Physical Laboratory:** Molecular Dynamics Simulations of Liquid-Solid Phase Transformation, Synthesis of Silver nanoparticles, Determination of ionic conductance on the onset of ion crowding effect (IC), Determination of critical micelle concentration of ionic micelles using equivalent conductance (CMC), Fluorescence Quenching using KI as ligand and Fluorescein as flurorophore
- **Biotechnology**: Biochemistry, Molecular Biotechnology, Cellular Biotechnology, Bioanalytical techniques and Bioinformatics, Fluorescence techniques in biotechnology
- **Chemical Engineering**: Chemical Process Calculations, Fluid Mechanics
- **Computer Science**: Introduction to C, Computer aided optimization
- **Mathematics**: Basic Calculus, Introductory Mathematical Economics
- **Online Certified Courses**: MATLAB Onramp, Optimization Onramp (MathWorks)

Positions of Responsibility

- **General Secretary, CheSTA**, student body of Chemistry department — *Aug. 2024 - present*

Core Team Member -

- **Xpressions**, Dramatics Club, IIT Guwahati — *Aug. 2022 - present*
- **Octaves**, Music Club, IIT Guwahati — *Sep. 2022 - present*

Achievements

- **GATE Biotechnology and Life Science**, Qualified with AIR - 804 and 271 respectively. *2024*
- **Joint Entrance Examination Main**, Achieved 97.42th Percentile among 1.04 million candidates across India. *2021*
- **Joint Entrance Examination Advanced**, Secured position in top 2.07% among 0.14 million candidates appearing for the examination. *2021*
- **Birla Institute of Technology and Science Admission Test.**, Secured position in top 1.6% among 0.3 million candidates appearing for the examination. *2021*
- **Maharashtra Common Entrance Test**, Achieved 99.0th Percentile among 0.4 million candidates across Maharashtra. *2021*
- **Class X ICSE boards**, Stood third in School, with 96.2%, scoring 100 in Computers. *2019*

Extracurriculars

- **Volunteer at National Service Scheme**, helping in social service activities — *Jan. 2023 - Present*
- **Organizer**, Techniche -*annual techno-management festival of IIT Guwahati* , Corporate Module — *2022*
- **Performed in a Play (theatre)**, organised by Xpression, the Dramatics club of IIT Guwahati — *22nd Feb. 2023*
- **Performed in Street play**, conveyed impactful social messages through the performance — *15th Aug. 2022*
- **Music**, Love Playing Piano, Melodica, Harmonium and Tabla

References

Dr. Sachin Kumar
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