

ANUJ BUCH

University of Pennsylvania

Department of Chemical and Biomolecular Engineering

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Google Scholar

EDUCATION

Qualification	Specialization	Institute	GPA/CPI	Year
PhD student PI: Dr. Dohyung Kim	<i>Chemical Engineering</i>	University of Pennsylvania	-	Present
B.Tech (Honors)	<i>Chemical Engineering</i>	Indian Institute of Technology Gandhinagar	9.38/10.0	2024

PUBLICATIONS

Publication Type	Title
Journal Article The Journal of Physical Chemistry C	Gaykwad, Bhagyashri; Thakur, Anupma; Buch, Anuj; Jasuja, Kabeer; Large-Scale Synthesis of Electrochemically Active Titanium Diboride-Based Nanosheets by High-Energy Ball Milling https://doi.org/10.1021/acs.jpcc.3c01388

AWARDS & ACHIEVEMENTS

- Awarded the **Daya Shanker & Shakuntala Scholarship**, for pursuing internship at Texas A & M University, USA 2023
- Awarded the **M. H. Divekar Scholarship**, for securing highest grade in Chemical Engineering course at the end of the third year of undergraduate study 2023
- Conferred **thrice** with the **Academic Excellence Scholarship** for achieving the **highest CPI** amongst Chemical Engineering students for consecutive academic years 2020-23
- Felicitated with **Dean's List Award** in **all the eligible semesters** for academic excellence 2021-23

INTERNSHIPS

Mechanics of Thermoplastic 3D Printed Polymeric Samples Post In-Bath Morphology Modification
Research Intern, Halliburton Engineering Global Programs, Texas A&M University, College Station, TX May '23 - July '23
Guide: Prof. Mohammad Naraghi, Texas A&M University and Dr. Frank Gardea, U.S. Army Research Laboratory

- Investigated the mechanics of thermoplastic 3D printed polymeric samples post in-bath morphology modification.
- Additively manufactured dog-bone samples with various raster orientations and determined the effect of in-bath heat treatment on mechanical properties.
- Discovered the optimal temperature range for strengthening the material up to 20% and established that it is essential to consider both temperature and treatment duration for specific characteristics being studied.

Energetic Additives for Tuning the Exothermicity of Ammonium Perchlorate (AP)

Research Intern, Defence Research and Development Organisation (DRDO), India & IIT Gandhinagar May '22 - July '22
Guide: Harini Gunda, Founder, MB₂ Boron • Faculty Mentor: Prof. Kabeer Jasuja, IITGN

- Summarized catalytically enhanced magnesium diboride's effect on the decomposition of AP
- Mastered the synthesis of *MgB₂* nanosheets through low and high energy ball milling
- Examined the results of internal and pilot scale testing to validate the effect of decomposition in 1% additive

RESEARCH EXPERIENCE

Development of Phase Change Material (PCM) to enhance Thermal Storage & Heat Transfer

Faculty Mentor: Prof. Kabeer Jasuja, Prof. Biswajit Saha, IITGN • Industry partner: Prompt DairyTech Aug '23 - Dec '23

- Designed a novel PCM by dispersing different nanomaterials into water using surfactants to reduce charging time (time required for the freezing process) to enhance energy efficiency and effectiveness in milk chilling system.
- Achieved a 50% reduction in the freezing time using graphene. The proposed solution is being tested at the pilot scale

Understanding the formation of nanostructures from surfactants

Faculty Mentor: Prof. Kabeer Jasuja, IITGN Jan '23 - Present

- Explored the preparation techniques of surfactant nanosheets and found a suitable solvent for their dispersion
- Carried out several optical, physical, and chemical characterizations to study the properties of these nanosheets.

Utilizing adsorption on graphene oxide to develop a UG curricular experiment

Faculty Mentor: Prof. Kabeer Jasuja, IITGN Aug '22 - Dec '22

- Planned an undergraduate laboratory experiment adapting adsorption as a handy tool to teach adsorption isotherms
- Validated the kinetics and Langmuir's isotherm model for Methylene Blue adsorption on Graphene oxide nanosheets
- Conducted experiments by varying MB concentrations, and temperatures, and studying adsorption thermodynamics

Synthesizing Boron Rich Nanoadditives for Solid Propellants

Faculty Mentor: Prof. Kabeer Jasuja, IITGN Jan '22 - July '22

- Prepared TiB_2 nanosheets through low-energy ball milling and identified parameters for optimized exfoliation
- Analyzed the samples using Scanning Electron Microscopy, Atomic Force Microscopy, X-ray diffraction, Inductively Coupled Plasma Optical Emission Spectroscopy, Thermogravimetric analysis, etc. to assess the different proportions
- Determined that there is 40% increase in the exothermicity of AP, supported by TGA, XRD analysis at 1% addition

TEACHING EXPERIENCE

Teaching Assistant, Chemical Reaction Engineering I - IITGN

Jan '24 - Apr '24

Teaching Assistant, Chemical Process Calculations - IITGN

Aug '23 - Dec '23

Teaching Assistant, Fluid Mechanics - IITGN

Jan '23 - May '23

Certification in Teaching - IITGN

Nov '22

TECHNICAL SKILLS

Programming Languages: Python | C++

Softwares/Tools: ASPEN PLUS | Simulink & Cantera - MATLAB | OriginPro | Microsoft Office |
Mathematica | \LaTeX | Autodesk Inventor

Techniques and Instruments: X-Ray Diffraction | UV-Vis Spectroscopy | Fluorescence Spectroscopy | TGA(novice)

Languages: English | Hindi | Gujarati

EXTRACURRICULARS

Convener, Green Club, IITGN

Oct '22 - Present

Lead Organiser, TEDxIITGandhinagar

Jan '23 - June '23

Marketing Executive in Blithchron '21, '22, The Annual Cultural Fest of IITGN

Jan '21 - Jun '22

Council Member, Industrial Relations & Project Council, IITGN

May '22 - May '23