

Aagam Shah

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Seeking a co-op starting August 2023. Interested in data-driven materials science. Experience in statistical modelling, machine learning, and materials synthesis.

EDUCATION

- **University of Illinois Urbana-Champaign (UIUC)** Aug '19 - May '24 (expected)
Doctor of Philosophy (PhD) in Materials Science & Engineering GPA : 3.56 / 4
- **Indian Institute of Technology (IIT) Gandhinagar** Jul '15 - Jul '19
Bachelor of Technology (BTech) with Honors in Materials Science & Engineering GPA : 8.49 / 10

TECHNICAL SKILLS

- **Languages:** Python, Bash, MATLAB, Javascript
- **Machine Learning:** Tensorflow, Scikit-learn, PyTorch
- **Tools:** Autodesk Fusion 360, Autodesk Inventor, PyQt5, SQLAlchemy, JMP, LabVIEW, Quantum ESPRESSO, Materials Studio, FactSage, \LaTeX

MAJOR PROJECTS

- **Graphene Recipes for Synthesis of High-Quality Materials (Gr-ResQ)** Sep '19 - *present*
Dr. Sameh Tawfick & Dr. Elif Ertekin, UIUC
 - Synthesised graphene using chemical vapour deposition. Varied specific reaction parameters - such as total gas flow rate and growth duration - using design of experiments and achieved high repeatability in the quality of graphene.
 - Performed active learning using Bayesian optimisation to exploit the experimental results and facilitate more efficient discovery of complex synthesis recipes.
 - Published software on nanoHUB to enable crowd-sourcing of synthesis recipes and analysis of microscopy images and Raman spectra, with more than 750 total users worldwide.
 - Automated segmentation of scanning electron microscopy images of graphene with a deep neural network with 94.5% pixel-wise accuracy using only 93 training images. Published the trained model, compatible with deepImageJ, at doi.org/10.5281/zenodo.7063245.
- **Optimising Laser Powder Bed Fusion for better manufacturing regimes** Jan '22 - *present*
Dr. Sameh Tawfick & Dr. Elif Ertekin, UIUC
 - Training a neural network to automatically segment cross-section images of single-track melt pools and identify the processing regime.
 - Using Bayesian optimisation to exploit the experimental results and find the parameter space in conduction mode.
 - Building web applications to crowd-source data and publish software to analyse images.
- **Biotemplating to synthesise inverse-gyroid photonic crystals** Jan '18 - Dec '18
Dr. Abhijit Mishra, IIT Gandhinagar
 - Created the gyroid phase in a mixture of 1,2-Dioleoyl-sn-glycero-3-phosphoethanolamine (DOPE) and 1,2-dioleoyl-sn-glycero-3-phospho-L-serine (DOPS) with Octa-arginine.
 - Attempted to create an inverse gyroid structure by crystallising CdS on the lipid gyroid template.

EXPERIENCE

- **Intern, Texas A&M University (TAMU)** May '18 - Jul '18
Composite Fabrication using conventional and 3D printing methods College Station, TX, USA
 - Built a filament winder (capable of b-staging with ultraviolet light) to produce prepreg and wind flywheel rotors.
 - Produced high fibre volume fraction (52%) polymer matrix composite using the filament winder.
- **Intern, Japan Advanced Institute of Science and Technology (JAIST)** Jun - Jul '17
Electronic structure calculations using high-performance computing (HPC) Nomi, Japan
 - Studied the energetics and plotted the emission spectra for adsorption of Nitrogen Monoxide (NO) gas on catalyst surfaces using DFT.
 - Implemented fully-automated scripts for carrying out DFT-based phonon calculations.

PUBLICATIONS AND PRESENTATIONS

- **Shah, A.**, Schiller, J. A., et. al. Automated Image Segmentation of Scanning Electron Microscopy Images of Graphene using U-Net Neural Network. *Manuscript submitted*.
- Schiller, J. A., Toro, R., **Shah, A.**, Surana, M., et. al. (2020). Crowd-sourced data and analysis tools for advancing the chemical vapor deposition of graphene: Implications for manufacturing. *ACS Applied Nano Materials*, 3(10), 10144-10155.
- Presented "Using Convolutional Neural Networks to Segment SEM Images of Graphene" at the **2022 MRS Spring Meeting**.
- Presented "Data-Driven Modelling of Graphene Synthesis" at the **TMS AIM 2022**.
- Presented "Experiments and Data-Driven Modeling of Graphene Synthesis by Chemical Vapour Deposition" at the **2021 MRS Fall Meeting**.
- Presented "Gr-ResQ — A Database for Graphene Synthesis Recipes" at the **2020 Virtual MRS Spring/Fall Meeting**.

HONORS & AWARDS

- Selected as an **NSF Research Trainee** in the **DIGI-MAT** program.
- **Director's Silver Medal, IIT Gandhinagar** for outstanding overall performance in Materials Science & Engineering.

OTHER ACTIVITIES

- **Guest instructor** for 3 lectures in Intro to Digital Materials (MSE 598) at UIUC in Spring 2021 and Spring 2020. Taught the fundamentals of Bayesian optimisation.
- **Instructed two workshops** on supervised and unsupervised techniques for segmentation of microscopy images as part of the Hands-on Data Science and Machine Learning Training Series on nanoHUB, with over 200 participants from around the world.
- **Captain** of the **IIT Gandhinagar Aquatics team** from April 2018 to April 2019.
- **Led the Industry Relations & Projects Council**, which facilitates **collaboration between industry and academia** by enabling students to work on industry-funded projects.
- **Led the entire team** of Amalthea '16 (annual technical summit of IIT Gandhinagar) comprising over 100 members. **Raised \$40,000** through corporate and government sponsorship.
- **Led the winning team** of the **UL Engineering Challenge 2015**; presented solutions for fire safety and shock hazards in rooftop photovoltaic installations.