

EDUCATION

Cornell University Ithaca, New York
M.S. with thesis in Materials Science and Engineering | GPA: 3.9/4 2018-2021

- **Advisors:** Prof. Richard Robinson & Prof. Tobias Hanrath
- **Research:** "Multiscale hierarchical structures from a nanocluster mesophase"
- **Summary:** MS thesis, 1st class hons., publication & a 1 yr co-op at Applied Materials

BITS (Birla Institute of Technology and Science) Pilani Pilani, India
Integrated B.E. in Chemical Engg. & M.Sc. in Chemistry | GPA: 7.5/10 2010-2015

EXPERIENCE

Applied Materials | Process Engineer (Now Sr. PE) Santa Clara, CA | 2021.10 - Now

- **Low-k dielectrics:** Driving process, precursor development for leading-node transistor logic & memory (<2nm) on plasma-enhanced ALD and CVD tools Olympia & Sym3
- **Photonic waveguide patterning:** Developed a directional and selective plasma ion etch process with the CTO group using 2.5D grayscale lithography for AR/VR application
- **Results:** Delivered multiple projects leading to 7-figure dollar product sales at various AMAT customers, 6 patents filed (4 granted, 2 pending) and an excellence award

Cornell University | M.S. Thesis, Robinson Lab Ithaca, NY | 2018.08 - 2021.05

- **Self-assembly:** Created a one-pot synthesis of quantum dot magic-sized nanoclusters (MSC) that self-assemble into 99.9% pure, 6% size-disperse hierarchical thin-films
- **Results:** Published this work in Nature Materials. The films exhibit huge chiroptical g-factors (>1.30), adapt to varied chemistry and scale 7 orders in magnitude (nm-cm)

MIT | Visiting Researcher, Ortony Lab Cambridge, MA | 2017.03 - 2017.07

- **Self-assembly:** Developed precursor and head-group syntheses for self-assembling amphiphiles at Prof. Julia Ortony's lab. This work was later extended into a platform for catalysis & metal remediation by the team with outstanding work in Nature nano

Harvard-MIT HST | Research Assistant, Shafiee Lab Boston, MA | 2016.08 - 2017.02

- **Pathogen detection:** Synthesized Platinum nanomotors to bind DNA via Thiol cross-linking, Polymerase chain-reaction (PCR) & Loop isothermal amplification (LAMP)
- **Results:** Published this work in ACS Nano & Nature Comm. Achieved 99% accurate HIV & Zika diagnosis by cellphone quantification of pathogen-bound motor velocity

IICT, CSIR | B.E. Thesis, Lingamallu Lab Hyderabad, India | 2015.01 - 2015.07

- **Dye-sensitized Solar Cells:** Designed & synthesized a light-harvesting photosensitizer containing an expanded Porphyrin & characterized it by EIS impedance spectroscopy
- **Results:** Iterated synthetic pathways & achieved a high-yield solution based on Dithienopyrrole bridges (80%). This structure allowed for highly efficient DSC ($\eta=10.3\%$)

PUBLICATIONS AND CONFERENCES

1. H. Han, S. Kallakuri, Y. Yao, C. Williamson, D. Nevers, B. Savitzky, R. Skye, M. Xu, O. Voznyy, J. Dshemuchadse, L. Kourkoutis, S. Weinstein, T. Hanrath and R. Robinson. Multiscale hierarchical structures from a nanocluster mesophase. *Nature Materials*, 21(5): 518-525, 2022
2. S. Kallakuri, Z. Zhang, R. Patil, L. Sun, M. Copic. A CNN-powered AI-driven approach to semiconductor defect classification. *AIx conference, Applied Materials*, 2022

3. M. Draz, K. Kochehbyoki, A. Vasan, D. Battalapalli, A. Sreeram, M. Kanakasabapathy, S. Kallakuri, A. Tsibris, D. Kuritzkes, H. Shafiee. DNA-engineered micromotors powered by metal nanoparticles for motion-based cellphone diagnostics. *Nature Communications*, 9(1): 4282, 2018
4. M. Draz, N. Lakshminaraasimulu, S. Krishnakumar, D. Battalapalli, A. Vasan, M. Kanakasabapathy, A. Sreeram, S. Kallakuri, P. Thirumalaraju, Y. Li, S. Hua, X. Yu, D. Kuritzkes, H. Shafiee. Motion-based immunological detection of Zika virus using Pt-nanomotors and a cellphone. *ACS Nano*, 12(6): 5709-5718, 2018
5. J. Avusula, S. Kallakuri, J. Subbalakshmi. Synthesis and characterization of templated Polyanilines: A new class of polymeric materials. *Functionalized engineering materials and their applications*, CRC Press (Taylor & Francis), 1(1): 117-124, 2016

PATENTS

- US20240040808A1 and US11956978B2: *Techniques & device structure based on directional seeding & selective deposition*. M. Zeeshan, K. Chan, S. Kallakuri, S. Varghese
- US11749564B2: *Techniques for void-free material depositions*. M. Zeeshan, K. Chan, S. Kallakuri, S. Varghese, J. Hautala
- US11404314B2: *Metal line patterning*. S. Varghese, M. Zeeshan, S. Kallakuri, K. Chan
- US20220100078A1: *Devices and methods for variable etch depths*. M. Zeeshan, R. Bandy, P. Kurunczi, S. Kallakuri, T. Soldi, J. Olson
- US20220119955A1: *Variable deposition profiles*. M. Zeeshan, S. Kallakuri, J. Olson

CERTIFICATIONS

Stanford: Harnessing the Power of AI/ML to Address New Engineering Challenges
Comprehensive 15-week course on A.I. with a final project 2024.01-2024.06

SKILLS

Semiconductors & clean-room: Thin-film growth (PECVD, PEALD, RIE, DRIE, ALE), selective & directional deposition and etch, 2.5D grayscale lithography, ellipsometry

Chemistry & functionalization: Quantum-dots, core-shell nanoparticles, conductive polymers, donor-acceptors, Porphyrins, amphiphiles, self-assembly, chiral and optical films

Characterization & separation: UV-Vis, XRD, NMR, FTIR, SAXS, OES, XPS, Thin-film ellipsometry, chromatography, polarized & optical microscopy, optical diffraction

Experimentation & statistics: Design of experiments (DOE), statistical process control (SPC), in-process control (IPC), root-cause & failure analysis (FMEA, SWOT), HOQ, TRIZ

Modelling & Simulation: Tableau, Seaborn, SAS (JMP), Pandas, Matplotlib, Numpy, Scipy, Scikit-learn, Lammmps, Gamess, Blender, Cinema4D, Solidworks, Autocad, Comsol

A.I. & M.L.: Neural networks, support vectors, regression, classification, clustering, trees

Coding: Python, Java, C++, Javascript, SQL, HTML/CSS

AWARDS AND HONORS

- Applied Materials internship award, Applied Materials 2020
- Undergraduate engineering & management award, T.I.M.E. institute 2014-2015
- BITS Pilani merit-cum-need (MCN) scholarship, BITS Pilani 2013-2015
- 2x Gold, 3x Bronze medals, National sports fests BOSM, SPREE, ARENA 2015
- Runner-up, National selection in Carrom, All-India Carrom Federation 2014

TEACHING AND MENTORSHIP

- Teaching Assistant, MSE5860 (Atomic Structure), Prof. Richard Robinson 2021
- Teaching Assistant, ENGRG1160 (Intro to Engineering), Prof. Van Dover 2020
- Mentor, Expanding your horizons (EYH), Grade 7-10 mentor to 4 classes 2020
- Teaching Assistant, MSE4330 (Energy Materials), Prof. Richard Robinson 2018
- Mentor, Chegg Tutors, Mentor to 32 UG students over the course of 2 years 2017

LEADERSHIP AND OUTREACH

- Project lead, Asha, Raised 18000\$ in fundraisers for rural education in India 2019
- Artist liaison, Spicmacay, Organized 8 concerts to popularize Carnatic music 2019
- Outreach lead, Yuva, Conducted 6 primary school summer-camps in India 2016
- Organizer, Nirmaan, Held regular Fluoride awareness camps in rural Telangana 2015
- Lead, Make a difference, Held 3 donation, 2 vaccine drives for public welfare 2014