

SHANTANU KALLAKURI

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EDUCATION

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

- *Advisors:* Prof. [Richard Robinson](#) & Prof. [Tobias Hanrath](#)
- *Research:* Developing multiscale hierarchical structures from nanocluster mesophases
- *Summary:* MS thesis, 1st class honors, publication and 1 yr co-op at Applied Materials

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

EXPERIENCE

Applied Materials | Process Engineer (Now Sr. P.E.) 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 directional and selective plasma ion etch processes with the CTO group by 2.5D [grayscale lithography](#) for AR/VR application
- *Results:* Delivered 2 projects leading to 7-figure dollar product sales at multiple 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 | 2017.03-2017.06

- *Self-assembly:* Developed precursor and head-group syntheses for amphiphilic self-assembly at Prof. Julia Ortony's lab. This work was later extended into a platform for catalysis & remediation by the team with some 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. Final Project, Lingamallu Lab Hyderabad, India | 2015.01-2015.07

- *Dye-sensitized solar cells:* Designed & synthesized a light-harvesting photo-sensitizer ($\eta=10.3\%$) containing a [Porphyrin macrocycle](#) & characterized it by EIS impedance

PUBLICATIONS & CONFERENCES

1. H. X. Han, S. Kallakuri, Y. Yao, C. B. Williamson, D. R. Nevers, B. H. Savitzky, R. S. Skye, M. Xu, O. Voznyy, J. Dshemuchadse, L. F. Kourkoutis, S. J. Weinstein, T. Hanrath and R. D. 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. S. Draz, K. M. Kochehyoki, A. Vasan, D. Battalapalli, A. Sreeram, M. K. Kanakasabapathy, S. Kallakuri, A. Tsibris, D. R. Kuritzkes, H. Shafiee. [DNA-engineered micromotors powered by metal nanoparticles for motion-based cellphone diagnostics.](#) *Nature Communications*, 9(1): 4282, 2018
4. M. S. Draz, N. K. Lakshminaraasimulu, S. Krishnakumar, D. Battalapalli, A. Vasan, M. K. Kanakasabapathy, A. Sreeram, S. Kallakuri, P. Thirumalaraju, Y. Li, S. Hua, X. G. Yu, D. R. 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 GRANTED

- [US11956978B2](#): Technique & device structure with directional & selective deposition
- [US20240040808A1](#): Technique & device structure with directional & selective deposition
- [US11749564B2](#): Techniques for void-free material depositions
- [US11404314B2](#): Metal line patterning
- [US20220100078A1](#) (Filed, pending): Devices and methods for variable etch depths
- [US20220119955A1](#) (Filed, pending): Variable deposition profiles

SKILLS

Thin-film growth: PECVD, PEALD, RIE, ALE, selective and directional deposition
Characterization: UV-Vis spectra, XRD, FTIR, XPS, NMR, SAXS, OES, chromatography
Patterning: 2.5D grayscale lithography, directed & amphiphilic self-assembly, ellipsometry
Optics: Grayscale litho, chiral materials, polarized and optical microscopy, laser diffraction
Synthesis: Quantum-dots, core-shell nanoparticles, conductive polymers, Porphyrin ligands
Process: Design of experiments (DOE), statistical control (SPC), in-process control (IPC)
Failure analysis: Root-cause analysis (RCA), failure analysis (FMEA, SWOT, FTA), HOQ
Statistics/Visualization: SAS (JMP), Tableau, Seaborn, Pandas, Matplotlib, Numpy, Scipy
AI/ML: Tensorflow, Pytorch, scikit, neural networks, regression, classification, clustering
Programming: Python (Fluent), Java (Fluent), C++, Javascript, SQL, HTML/CSS
Simulation/Modelling: Lammmps, Comsol, Fluent CFD, Blender, AutoCad, Solidworks

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

AWARDS & 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 & MENTORSHIP

- **Teaching Assistant**, [MSE5860](#) (Atomic Structure), Prof. Richard Robinson 2021
- **Teaching Assistant**, [ENGRG1060](#) (Intro to Engineering), Prof. Rob Van Dover 2019
- **Mentor**, [Expanding your horizons \(EYH\)](#), Grade 7-10 mentor to 4 classes 2019
- **Teaching Assistant**, [MSE4330](#) (Energy Materials), Prof. Richard Robinson 2018
- **Mentor**, [Chegg Tutors](#), Mentor to 32 undergrads over the course of 2 years 2017

LEADERSHIP & OUTREACH

- **Team lead**, [Asha](#), Raised over 18000\$ in funds 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](#), Regularly held Fluoride awareness camps in rural Andhra 2015
- **Lead**, [Make a difference](#), Held 3 donation, 2 vaccine drives for public health 2014