

Polymer scientist and engineer with extensive background in Machine Learning for chemicals, structure-property relationships, metamaterials, processing and characterization, industrial coating technologies and formulations, and organic chemistry.

14 papers published/submitted
17 conference presentations
7 leadership roles **16** researchers advised
17 students mentored **12** classes taught

EXPERIENCE



POSTDOCTORAL FELLOW

UNIVERSITY OF ARKANSAS / Nayani and Nakarmi group / 2021 – present

- Lightweight convolutional neural networks (CNNs) for micrographs
- Machine learning algorithms to predict heat-stress in organisms
- Coronavirus sensor design using CNNs on liquid crystal micrographs
- Teaching computers about functional groups on polymer chains
- Deep learning algorithms to extract pollutant composition from totals

GEORGIA INSTITUTE OF TECHNOLOGY / Shofner and Russo group / 2018 – 2021

- Machine learning for noise detection in scattering data
- Metamaterial composite fabrication using tensegrity/auxetic approaches
- Executive Director (OPALL: Open Polymer Active Learning Laboratory)
 - Established safety, supplies, materials, teams, activities, and website
 - Acted as a liaison between the board of advisors and students

SENIOR COATING CHEMIST

KIMOTO TECH / 2016 – 2018

- Team leader for 5 R&D chemists
- Research and development of protective & flexible coatings exhibiting properties of UV-blocking, scratch and chemical resistance, electrical conductivity, anti-glare, etc.
- Development of conductive coatings and pressure sensitive adhesives
- Scale-up and production of several lab-to-market projects

PHD CANDIDATE

GEORGIA INSTITUTE OF TECHNOLOGY / Griffin and Shofner group / 2011 – 2015

- Synthesized intrinsically auxetic liquid crystal polymers
- Developed a new protocol for accurately measuring Poisson's ratio
- Developed a new method to induce auxetic properties in nonwovens
- Explained and modeled auxetic behavior of paper
- Analyzed network deformations through micro-CT and finite element analysis
- Established processing-structure-property relations for auxetic response in fiber networks

RESEARCH ASSISTANT (MASTER'S)

UNIVERSITY OF AKRON / Karim group / 2011

- Developed a buckling-based metrology to determine strength of thin films
- Prepared and tested strength of polymer-blend films used in tissue engineering

EDUCATION

PHD / 2011 – 2015

GEORGIA INSTITUTE OF TECHNOLOGY

Materials Science and Engineering (polymers)

GPA 4.0 / 4.0

BS AND MS / 2006 – 2011

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Polymer Science and Technology

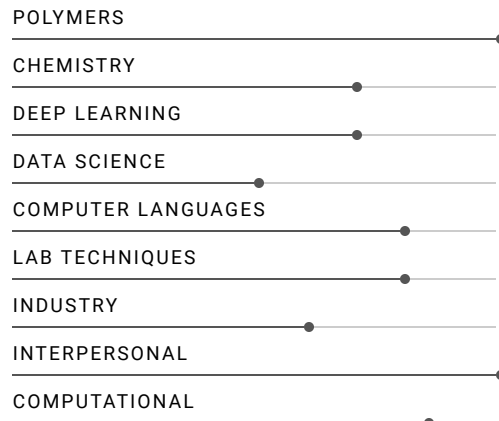
GPA 8.5 / 10.0

HONORS & AWARDS



2021 5 year Mentorship Award
2020 Invited talk, IIT Roorkee
2019 Executive Director, OPALL
2019 Hightower Fellow, OPALL
2017 Chairman, Tech. Conference, Kimoto
2014 2nd best poster, Auxetic Conference

SKILLSETS



EXPERIENCE (CONTD.)

SUMMER INTERN

UNIVERSITY OF MASSACHUSETTS AMHERST / McCarthy group / 2010

- Synthesized uniformly sized silica nanoparticles for composite applications
- Created super-hydrophobic surfaces using silanes; synthesized cross-linked silicones

SUMMER INTERN

UNIVERSITY OF MINNESOTA / Barocas group / 2009

- Synthesized epoxy networks to study flow through kidney membranes
- Synthesized and characterized collagen gels for tissue engineering

SELECT PUBLICATIONS

7 of 20
shown

- P Verma, KB Wagner, AC Griffin, ML Shofner; *Reversibility of auxetic response in polyester fiber needle-punched nonwovens*; Physica Status Solidi B; **2022** ↗
- H Sun, X Fang, Z Fang, ..., P Verma, et al.; *An ultra-sensitive and stretchable strain sensor based on micro-crack structure for motion monitoring*; Micro Nano (Nature); 8 (111); **2022** ↗
- P Verma, C Smith, AC Griffin, ML Shofner; *Towards textile metamaterials: A pathway to auxeticity and tensegrity in a needle-punched nonwoven stiff felt*; Materials Advances (RSC); **2022** ↗
- Q Kang, X Fang, C Wu, P Verma, H Sun, et al.; *Improvement mechanism of brittle-plastic transition and residual stress in scratching 4H-SiC implanted by hydrogen ions*; Ceramics International; **2022** ↗
- P Verma, C Smith, AC Griffin, ML Shofner; *Corrigendum: Wool nonwovens as candidates for commodity auxetic materials*; Engineering Research Express; 4 029501; **2022** ↗
- Q Kang, X Fang, C Wu, P Verma, H Sun, et al.; *Mechanical properties and indentation-induced phase transformation in 4H-SiC implanted by hydrogen ions*; Ceramics International; **2022** ↗
- P Verma, C Smith, AC Griffin, ML Shofner; *Wool nonwovens as candidates for commodity auxetic materials*; Engineering Research Express; 2 (4); **2021** ↗

SELECT PRESENTATIONS

7 of 17
shown

- 🗨 Constructing out-of-plane auxetic response in paper; Denver (USA); 2020
- 🗨 Auxetic behavior in fiber networks; San Diego (USA); 2019
- 🗨 OPALL: The open polymer active learning laboratory at Georgia Tech; Orlando (USA); 2019
- 🗨 X-ray scattering from LC polymers: Implications for auxetic response; Bedlewo (Poland); 2019
- 🗨 Auxetic liquid crystalline polymers; Crete (Greece); 2017
- 🗨 Reversibility of thickness change in nonwovens; Poznan (Poland); 2016
- 🗨 Elastic moduli of polymeric thin films of nanocomposites and blends via buckling on elastomeric substrates; Boston (USA); 2012

LEADERSHIP



2019 – 2021 / GEORGIA TECH

DEI council representative for research scientists & postdocs in the department

2019 – PRESENT / GEORGIA TECH

Co-launched, Postdoc Chats, series of social and professional development gatherings for postdocs campuswide

2019 – PRESENT / GEORGIA TECH

Advisor, to graduate and undergraduate members and users, OPALL Polymer Makerspace

2016 – 2018 / KIMOTO TECH

Team Leader, for 5+ industry research scientists

2013 – 2015 / GEORGIA TECH

Co-manager, Polymer Thermal Analysis Lab

RESEARCH ADVISOR



for **16** industry members / graduates / undergraduates in the following broad areas

- ↗ unsupervised & supervised learning
- ↗ industrial coatings
- ↗ coacervation thermodynamics
- ↗ auxetics and metamaterials
- ↗ nanocomposites

*direct supervisor for **13**

MENTORSHIP



Served as a mentor for **Mentor Jackets, MSE Industry Mentoring and IITR's Alumni Mentorship Program** since 2016.

- 9** Bachelor's students
- 6** Doctoral students
- 2** Master's students

DIVERSITY

Percentage of the total **33** advised/mentored

- 49** % women
- 16** % hispanics & latinos
- 07** % african americans
- 43** % internationals
- 19** % first-gen college goers

SKILLSETS

POLYMERS

AUXETIC MATERIALS
BIOPOLYMERS
CHARACTERIZATION
COACERVATES
LIQUID CRYSTALS
MACHINE LEARNING
NETWORK DEFORMATIONS
NETWORKS
POLYMER PROCESSING
SILANES AND SILICONES
STRUCTURE-PROPERTY RELATIONSHIPS
THERMAL ANALYSIS
THIN FILMS
TISSUE ENGINEERING
VISCOELASTICITY

CHEMISTRY

FREE-RADICAL POLYMERIZATION
LCE SYNTHESIS
POLYURETHANE SYNTHESIS
SILANE CHEMISTRY
SILICONE SYNTHESIS
THERMAL CURING
UV CURING

DEEP LEARNING

CNNS
IMAGE PROCESSING
NEURAL NETWORKS
RESNETS
SUPERVISED LEARNING
SVMS

DATA SCIENCE

CLUSTERING
LINEAR REGRESSION

COMPUTER LANGUAGES

ACTIONSRIPT
C/C++
JAVASCRIPT
MATLAB
PHP
PYTHON
SQL

LAB TECHNIQUES

AFM
DMA
DSC
ENVIRONMENTAL TESTING
FTIR
ITC
MECHANICAL TESTING
MICRO-CT
SEM
TGA
VISCOMETRY

INDUSTRY

ADHESIVE COATINGS
BAR COATING
BATCH MIXING
COATING FORMULATIONS
HARD COATS
SCALE-UP OPERATIONS
SLOT DIE COATING
THERMAL CURING
UV CURING

INTERPERSONAL

CAREER COUNSELLING
ILLUSTRATION
LEADERSHIP
MENTORING
RESEARCH ADVISING
SPEAKING
TEACHING
TEAM BUILDING

COMPUTATIONAL

ABAQUS
CHEMOFFICE
DJANGO
MATERIAL STUDIO
MATLAB
MATPLOTLIB
MOLECULAR OPERATING ENV.
NUMPY
PANDAS
PILLOW
TENSORFLOW

TEACHING

Guest lecturer, guest instructor (for labs) and teaching assistant for a total of 12 courses at Georgia Tech in the following broad areas:

Thermal analysis of polymers, polymerization reactions, mechanical and viscoelastic properties of polymers, rheology, and introductory materials science

EXTRACURRICULARS

- Gets way too excited about web development and graphics design
- Is the best table tennis player in the break room
- Paints and draws

REFERENCES

ANSELM C GRIFFIN

Professor Emeritus, Georgia Tech
✉ anselm.griffin@mse.gatech.edu

MEISHA L SHOFNER ✉

Associate Professor, Georgia Tech
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KARTHIK NAYANI ✉

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