

PRATEEK VERMA

PHD / POLYMER SCIENTIST

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

13 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

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



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



POLYMERS

CHEMISTRY

DEEP LEARNING

DATA SCIENCE

COMPUTER LANGUAGES

LAB TECHNIQUES

INDUSTRY

INTERPERSONAL

COMPUTATIONAL

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 19
shown

- H Sun, Z Fang, L Zhao, **P Verma**, B Tian, et al.; *An ultra-sensitive and stretchable strain sensor based on micro-crack structure for motion monitoring*; in press, Micro Nano (Nature Pub. Group); **2022**
- **P Verma**, C Smith, AC Griffin, ML Shofner; *Corrigendum: Wool nonwovens as candidates for commodity auxetic materials*; In press. Engineering Research Express; ERX-101673; **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** ↗
- **P Verma**, C He, AC Griffin; *Implications for auxetic response in liquid crystalline polymers*; Physica Status Solidi B; 2000261; **2020**; (appeared in Wiley's 'Hot Topics: Liquid Crystals') ↗
- N Jappar, **P Verma**, J Holmes; *Development of functional films in roll-to-roll manufacturing*; RadTech; **2018**; (conference paper) ↗
- **P Verma**, ML Shofner, A Lin, KB Wagner, AC Griffin; *Induction of auxetic response in needle-punched nonwovens: Effects of temperature, pressure and time*; Physica Status Solidi B; 253 (7); **2016** ↗

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 staff 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

ActionScript

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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PAUL S RUSSO ✉

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KARTHIK NAYANI ✉

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