

Preetika Karnal

SAN JOSE, CA

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Summary

Ph.D in Chemical and Biomolecular Engineering from **Johns Hopkins University** and B.Tech in Chemical Engineering with Honors from **IIT Bombay**, with extensive peer-reviewed research experience spanning over 8 years.

Seeking roles in process engineering, **materials science**, chemical engineering, **machine learning** or related fields.

Detail-oriented and innovative **problem-solver** with strengths in **machine learning models**, laboratory experience, data analysis, and cross-functional **collaboration**, complemented by prior experience at reputed organizations such as **3M Company** and **HPCL-Mittal Energy Limited**.

Education

Johns Hopkins University

PH.D. IN CHEMICAL AND BIOMOLECULAR ENGINEERING

- Advisor: Joelle Frechette

Baltimore, MD

2021

Indian Institute of Technology Bombay

B.TECH IN CHEMICAL ENGINEERING *with Honors*

- Advisor: Mahesh Tirumkudulu

Mumbai, MH

2014

Skills

Software	Python (pandas, sklearn) , C++, LabView, ImageJ, MATLAB, Origin Pro, LaTeX, Abaqus
Material characterization	Oscillatory Rheology, Adhesion testing, Microscopy
Surface characterization	Zeta potential, Contact Angle, Fourier Transfer Infrared Spectroscopy, Optical Interferometry
Surface treatments	Glass Silanization, Plasma treatment, Piranha treatment

Work Experience

Postdoctoral Research Associate

LEHIGH UNIVERSITY | PI: ANAND JAGOTA

Bethlehem, PA

Sep 2021 - PRESENT

- Led a project on interfacial mechanics and surface energetics.
- Developed an innovative tool to measure adhesion in rough elastomers, rigorously validated through **statistical analysis**.
- Automated image processing using **machine learning**, saving 1200 hours of manual work.

Doctoral Researcher

JOHNS HOPKINS UNIVERSITY | PI: JOELLE FRECHETTE

Baltimore, MD

Aug 2015 - Jul 2021

- Led research on viscoelasticity and interfacial phenomena in adhesive thin films under extreme conditions.
- Mastered new techniques and resolved challenges related to home-built Multifunctional Force Microscope.
- Analyzed pH-dependent adhesion of acrylic polymers, informing underwater adhesive design.
- Collaborated on connecting viscoelastic polymer deformation with Saffman-Taylor instabilities during debonding.

Summer Intern

3M COMPANY | SUPERVISOR: DR. CARLOS BARRIOS

Summer 2018

- Conducted high-resolution imaging of pressure-sensitive adhesive tapes during debonding in various environments.
- Developed an enhanced protocol for quantifying underwater adhesion in peel and tensile modes.

Graduate Engineer Trainee

2014-2015

HPCL-MITTAL ENERGY LIMITED | SUPERVISOR: GAURAV KUMAR GUPTA

- Optimized feed components and conducted root cause analyses to enhance product yield and quality.
- Developed daily production plans aligning with market conditions, demand, and supply.

Summer Researcher

Edmonton, CA

UNIVERSITY OF ALBERTA | PI: ARVIND RAJENDRAN

May 2013 - Jul 2013

- Optimized productivity in simulated moving bed chromatography using Triangle Theory.
- Presented findings through a poster and a video conference with experts at LIT, Finland.

Undergraduate Researcher

Mumbai, MH

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY | PI: MAHESH TIRUMKUDULU

2013 - 2014

- Investigated dynamic thickness changes in soap films under acoustic forcing using fluorescence imaging.
- Observed and quantified mass accumulation at antinodes, correlating with increased light intensity.

Publications

*co-first authors

1. Li, M.*, **Karnal, P.***, Lu, Y.*, Hui, C.Y., and Jagota, A., *Slicing of a soft solid*, Journal of Chemical Physics, 159(11), 2023.
2. **Karnal, P.**, Wang, Y., Jha, A., Gryska, S., Barrios, C., and Frechette, J., *Interface stabilization in adhesion caused by elastohydrodynamic deformation*, Physical Review Letters, 131(13):138201, 2023.
3. Lamberty, Z. D., Tran, N. T., van Engers, C. D., **Karnal, P.**, Knorr Jr, D. B., and Frechette, J., *Cooperative Tridentate Hydrogen-Bonding Interactions Enable Strong Underwater Adhesion*, ACS Applied Materials and Interfaces, 15(29):35720–35731, 2023.
4. Jha, A., **Karnal, P.** and Frechette, J., *Adhesion of fluid infused silicone elastomer to glass.*, Soft Matter, 18(39):7579–7592, 2022.
5. **Karnal, P.**, Jha, A., Wen, H., Gryska, S., Barrios, C., and Frechette, J., *Contribution of Surface Energy to pH-Dependent Underwater Adhesion of an Acrylic Pressure-Sensitive Adhesive.*, Langmuir, 35(15):5151–5161, 2019.
6. **Karnal, P.**, Roberts, P., Gryska, S., King, C., Barrios, C., and Frechette, J., *Importance of Substrate Functionality on the Adhesion and Debonding of a Pressure-Sensitive Adhesive under Water.*, ACS applied materials and interfaces, 9(48):42344–42353, 2017.
7. Dillard, D. A., Mukherjee, B., **Karnal, P.**, Batra, R. C., and Frechette, J., *A review of Winkler's foundation and its profound influence on adhesion and soft matter applications.*, Soft Matter, 14(19):3669–3683, 2018.
8. Maruyama, R. T., **Karnal, P.**, Sainio, T., and Rajendran, A., *Design of bypass-simulated moving bed chromatography for reduced purity requirements.*, Chemical Engineering Science, 205:401–413, 2019.