

# AMAL NARAYANAN, Ph.D.

*Postdoctoral Research Associate*

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## EDUCATION

### **The University of Akron**

Ph. D. in Polymer Science, March 2021

### **Indian Institute of Science Education and Research Kolkata**

Integrated B.S. and M.S. in Chemical Sciences, May 2015

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## AWARDS AND HONORS

- 2021 Peebles and Alan N Gent award for distinguished paper from The Adhesion Society
  - 2021 APS DSOFTE support grant for attending the annual APS March meeting
  - 2020 Awarded lectureship in the ACS POLY Excellence in Graduate Polymer Research Symposium at Philadelphia nominated by the University of Akron
  - 2019 The opioid detection technology won \$10,000 at the University of Akron Challenge
  - 2019 Top 8 finalist in the American Chemical Society's first annual Entrepreneur Pitch Training and Competition
  - 2019 Discussion leadership at the Science of Adhesion Gordon Research Seminar by the Gordon research conference committee
  - 2018 Frank N. Kelley Outstanding Graduate Student Award presented by the College of Polymer Science and Polymer Engineering, The University of Akron
  - 2015 International travel grant from MHRD, India, for attending an international conference in Shanghai, China
  - 2010 – 2015 Awarded the Innovation in Science Pursuit for Inspired Research (INSPIRE-SHE) Scholarship from the Department of Science Technology, Govt. of India
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## ACQUIRED RESEARCH FUNDING

- 2019 Co-written grant application with Prof. Abraham Joy that won \$120,000 (Phase I and II) in the 2019 Sherwin-Williams & University of Akron Innovation Challenge
  - 2018 Technical lead of the ProfProtects team that awarded \$200,000 for winning the Opioid Technology Challenge (Phase 2) presented by Ohio's Third Frontier
  - 2015 The grant application co-wrote with Prof. Priyadarsi De awarded \$25,000 from the joint mission of DST, India and RFBR, Russia, Award No. INT/RUS/RFBR/P-187
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## RESEARCH EXPERIENCE

- 04/21 - **Princeton University**  
present Postdoctoral Research Associate in the research group of Prof. Clifford Brangwynne, Department of Chemical and Biomolecular Engineering
- My current research focuses on developing endogenous tools to interrogate the interfacial properties of the cellular membraneless organelles.
  - These tools will provide basic understanding on the origin of mis-shaped organelles that are found in cell lines with cancer and neurodegenerative diseases.
- 01/16 –03/21 **The University of Akron**  
Doctoral research in the research group of Prof. Abraham Joy, Department of Polymer Science  
Dissertation: ‘Physiochemical Cues for the Design of Underwater Adhesives’
- Created biodegradable polymers that display pH and salt insensitive liquid-liquid phase separation and identified their unique rheological, wetting, and underwater adhesive properties. *ACS Nano*, 2020
  - Identified the thermodynamic design rationale behind molecular functional groups that actuate the underwater adhesion of degradable polymers using contact force measurements, spectroscopy, and MD simulations. *ACS Cent. Sci.* 2018 and *Biomacromolecules* 2019
- 10/18 –  
06/19 **ProfProtects, LLC**  
Co-founder and technical lead of the patented colorimetric opioid detecting technology ‘OPI-Wipes’
- 08/13 –  
04/15 **Indian Institute of Science Education and Research Kolkata**  
Master’s research in the research group of Prof. Priyadarsi De, Department of Chemical Sciences  
Dissertation: ‘Volume Phase Transition of Stimuli-Responsive Polymers: An Investigation *via* Mueller Matrix Polarimetry’  
Synthesized stimuli-responsive polymers and developed precise analytical techniques to characterize their phase transition behavior in ultra-dilute aqueous solutions. *Anal. Chem.* 2015, *Langmuir* 2014, and *Polym. Chem.* 2015

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## MENTORING AND OUTREACH

- 2020 –  
present **The Soft Matter Show** – [thesoftmattershow.com](http://thesoftmattershow.com)  
Hosts an online podcast platform for portraying the state-of-the-art research and career of researchers in the field of polymer science and soft materials.

- 06/20 – **JoyLab Polymerase** – joyresearch.org/polymerase
- 03/21 Created JoyLab Polymerase – an online video platform that showcases the experimental procedures to generate scientific awareness and reproducibility.
- 10/16 – **Prof. Abraham Joy's research group**, The University of Akron, Akron, OH
- 03/21 Mentored junior graduate students (6), undergraduate research assistants (3), NSF-REU students (3), and high school students (3) on lab safety protocols, organic synthesis, spectroscopic techniques, rheology, and adhesion testing
- 2015 Fall **Teaching Assistant**, Department of Polymer Science, The University of Akron, Introductory Polymer Science Lab (20 graduate students)

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### PEER-REVIEWED PUBLICATIONS (Click on the citation to direct to the paper)

1. [Narayanan, A.](#); Dhinojwala, A.; Joy, A. *Chem. Soc. Rev.* 2021, in press.
2. Patil, R.; Sancaktar, E.; [Narayanan, A.](#); Tantisuwanno. *C. Biointerface Res. Appl. Chem.* 2021, in press.
3. [Narayanan, A.](#)<sup>#</sup>; Kaur, S.<sup>#</sup>; Kumar, N.; Tsige, M.; Joy, A.; Dhinojwala, A. *Macromolecules* 2021, *54*, 5417-5428.
4. Tseng, Y.-M.; [Narayanan, A.](#); Mishra, K.; Liu, X.; Joy, A. *ACS Appl. Mater. Interfaces* 2021, *13*, 29048-29057.
5. [Narayanan, A.](#); Menefee, J. R.; Liu, Q.; Dhinojwala, A.; Joy, A. *ACS Nano* 2020, *14*, 8359-8367.
6. [Narayanan, A.](#); Xu, Y.; Dhinojwala, A.; Joy, A. *ChemEngineering* 2020, *4*, 32(1-18).
7. Liu, Q.; Jain, T.; Peng, C.; Peng, F.; [Narayanan, A.](#); Joy, A. *Macromolecules* 2020, *53*, 3690-3699.
8. Jain, T.; Clay, W.; Tseng, Y.-M.; Vishwakarma, A.; [Narayanan, A.](#); Ortiz, D.; Liu, Q.; Joy, A. *Polym. Chem.* 2019, *10*, 5543-5553.
9. [Narayanan, A.](#); Kaur, S.; Peng, C.; Debnath, D.; Mishra, K.; Liu, Q.; Dhinojwala, A.; Joy, A. *Biomacromolecules* 2019, *20*, 2577-2586.
10. Liu, Q.; Yuan, S.; Guo, Y.; [Narayanan, A.](#); Peng, C.; Wang, S.; Miyoshi, T.; Joy, A. *Polym. Chem.* 2019, *10*, 2579.
11. Liu, Q.; Wang, C.; Guo, Y.; Peng, C.; [Narayanan, A.](#); Kaur, S.; Weiss, R. A.; Joy, A. *Macromolecules* 2018, *51*, 9294-9305.
12. Kaur, S.;<sup>#</sup> [Narayanan, A.](#)<sup>#</sup> Dalvi, S.; Liu, Q.; Joy, A.; Dhinojwala, A. *ACS Cent. Sci.* 2018, *4*, 1420-1429.
13. Xu, Y.; Liu, Q.; [Narayanan, A.](#); Jain, D.; Dhinojwala, A.; Joy, A. *Adv. Mater. Interfaces* 2017, *4*, 1700506(1-6).
14. Bauri, K.; Pan, A.; Haldar, U.; [Narayanan, A.](#); De, P. *J. Polym. Sci. Part A: Polym. Chem.* 2016, *54*, 2794-2803.
15. [Narayanan, A.](#); Chandel, S.; Ghosh, N.; De, P. *Anal. Chem.* 2015, *87*, 9120-9125.
16. Bauri, K.; [Narayanan, A.](#); Haldar, U.; De, P. *Polym. Chem.* 2015, *6*, 6152-6162.
17. [Narayanan, A.](#); Maity, B.; De, P. *React. Funct. Polym.* 2015, *91*, 35-42.

18. Narayanan, A.; Bauri, K.; Ruidas, B.; Pradhan, G.; Banerjee, S.; De, P. *Langmuir* 2014, 30, 13430–13437.
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## PATENTS

1. Abraham Joy, Amal Narayanan, Tanmay Jain, Russell Catania, Nicholas Nun. Methods and Devices that Change Color to Indicate the Presence of Opioids and Other Narcotics (International Patent Serial No: WO2020/04174A1)
  2. Abraham Joy, Amal Narayanan. Non-Ionic Coacervates for Dry, Humid and Wet Adhesion (United States Patent Application Serial No: PCT/US16/700130)
  3. Abraham Joy, Apoorva Vishwakarma, Amal Narayanan. Use of Polymer Coacervates for the Disruption and Removal of Biofilms. United States Provisional Patent.
  4. Abraham Joy, Amal Narayanan, Kaushik Mishra. Preparation of Catechol Containing Polymer Emulsion and Their Deprotection and Post-polymerization. United States Provisional Patent.
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## PROFESSIONAL COURSES

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| 2019 | <b>Georgia Institute of Technology - Institute for Electronics &amp; Nanotechnology</b><br>'Soft Lithography for Microfluidics' (3 days) |
| 2019 | <b>University of Akron Research Foundation</b><br>'NSF I-Corps site program', entrepreneurial lead, (7 weeks)                            |
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## SELECTED APPEARANCES IN POPULAR MEDIA

### **Underwater adhesive research**

1. C&E News highlighted the work showcasing on phase separating the underwater adhesive.
2. Featured in the popular science show 'Nature Knows Best' Season 2, Episode 10 Medicine available at Amazon prime and Hulu.com for streaming.
3. Highlighted by insiderscience.org in an article titled 'Flow like an oil, stick like a mussel'

### **Opioid detection technology**

1. Primetime news of WKYC channel 3 covered the opioid detection technology in action
  2. ABC channel 5 news covered our Ohio opioid technology challenge award
  3. "Opiate detection startup wins \$10,000" covered by University of Akron News
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## SELECTED CONFERENCES AND PRESENTATIONS

1. Narayanan, A.; Kaur, S.; Dhinojwala, A.; Joy, A. 'Bioinspired tricks and consequences in adhering underwater: From hydrophobicity to non-ionic coacervation', ACS POLY/PMSE Excellence in Graduate Research Symposium, Virtual ACS National Meeting 2020 – invited virtual talk
  2. Narayanan, A.; Kaur, S.; Liu, Q.; Dhinojwala, A.; Joy, A. Chemistry of Underwater Adhesion: From Understanding the Contact Mechanics of Bioinspired Adhesives to Sealing Pericardial
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- Defects, Gordon Research Seminar and Conference on Science of Adhesion, July 19-26, 2019, at Mt. Holyoke College, MA, USA – poster presentation
3. Narayanan, A.; Kaur, S.; Dhinojwala, A.; Joy, A. ‘Mussel-inspired Polyester Adhesives Demonstrate the Importance of Hydrophobicity in Underwater Adhesion’, The 19th International Congress on Marine Corrosion and Fouling at Melbourne 2018, Florida, USA – invited talk
  4. Narayanan, A.; Kaur, S.; Dhinojwala, A.; Joy, A. ‘Designing Bioinspired Adhesives for Various Hydrated Surfaces’, National Graduate Research Polymer Conference 2018, Minneapolis, Minnesota, USA - talk
  5. Narayanan, A.; Kaur, S.; Liu, Q.; Xu, Y.; Dhinojwala, A.; Joy, A. “Mussel-Inspired Adhesives with Hydrophobic Groups for Underwater Adhesion, Gordon Research Seminar and Conference on Science of Adhesion, July 22-28, 2017 at Mount Holyoke College, MA, USA. – poster presentation
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#### **PROFESSIONAL ORGANIZATION AFFILIATIONS**

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|----------------|--|
| 2020 - present | <b>American Institute of Chemical Engineers</b> , Member                 |
| 2020 - present | <b>American Physical Society</b> , Member                                |
| 2016 - present | <b>ACS POLY/PMSE Division Student Chapter at The University of Akron</b> |
| 2016 - 2017    | Founding Member and Treasurer  |
| 2017 - present | <b>Adhesion Society</b> , Member   |
| 2015 – present | <b>American Chemical Society</b> , Member                                |
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