

## Jin Gyun Lee

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### EDUCATIONS

**Doctor of Philosophy in Chemical Engineering** *May 2021*

Louisiana State University, Baton Rouge, LA

Dissertation: *Adsorption and Transport of Colloids at Interfaces and in Bulk* – Recipient of the University Distinguished Dissertation Award

**Bachelor of Science in Chemical Engineering** *December 2015*

North Carolina State University, Raleigh, NC

### RESEARCH EXPERIENCE

**Cain Dept. of Chemical Engineering, Louisiana State University, Baton Rouge, LA**

Research Assistant Professor, Advisor: Prof. Bhuvnesh Bharti

*January 2026–present*

- Direct assembly of non-spherical particles in AC electric fields

**Dept. of Chemical and Biological Engineering, Univ. of Colorado Boulder, Boulder, CO**

Postdoctoral Associate, Advisor: Prof. C. Wyatt Shields IV

*June 2021–December 2025*

- Designed formulation of bio-adhesive soft dendritic particles for bladder cancer therapy
- Developed bubble-based microrobots for drug delivery in bladders
- Engineered thermoresponsive shape-morphing active particles

**Cain Dept. of Chemical Engineering, Louisiana State University, Baton Rouge, LA**

Graduate Research Assistant, Advisor: Prof. Bhuvnesh Bharti

*December 2016–May 2021*

- Elucidated protein adsorption and corona formation on nanoparticles
- Developed microrobots that can self-propel along non-linear 3D trajectories for enhanced particle transport in porous membrane
- Formulated ecofriendly oil herders using lignin nanoparticles for oil spill recovery
- Designed 3D printable plant-based composite using lignin and zein

### SELECTED HONORS & AWARDS

- 2022 Distinguished Dissertation Award in Science, Technology, Engineering & Mathematics by LSU Alumni Association *2022*
- 2022 Outstanding Ph.D. Dissertation Award by LSU College of Engineering *2022*
- 2021 Hanwha Travel Award in the 2021 AIChE Annual Meeting *2021*
- Langmuir Student Awards Session in the 93<sup>rd</sup> ACS Colloid & Surface Science Symposium *2019*
- ACS Colloid and Surface Chemistry Division Outstanding Student Poster Award from the 255<sup>th</sup> ACS National Meeting *2018*

### PUBLICATIONS ([Link to Google Scholar profile](#))

- 1) **J.G. Lee**<sup>†</sup>, S.J. Jeon<sup>†</sup>, A.R. Duarte, M. Ticknor M.B. Minnis, R.C. Hayward, C.W. Shields IV, “Shape-morphing active particles for configurable locomotion and in situ steering”, accepted in *Nature Communications*, 17, 51, (2026). <sup>†</sup>equal contribution [link](#)

- 2) **J.G. Lee**, J. Petraccione, K.A. Trese, A.C. Hughes, T.R. Ausec, M. Salzman-Sullivan, L.J. Su, M.T. Kim, S. Roh, A.P. Goodwin, F.X. Feng, T.W. Flaig, C.W. Shields IV, “Soft extrudable dendritic particles with nanostructured tendrils for local adhesion and drug release to bladder cancers”, *Advanced Materials*, 37, 2505231, (2025). [link](#)
- 3) M. Iftesum, M. Dey, A. Prasad, **J.G. Lee**, R. Devireddy, B. Bharti, M.R. Gartia, “pH-Tuned Self-Assembly of Janus Particles for Enhanced Raman Imaging and Sensing”, *Analytical and Bioanalytical Chemistry*, (2025). [link](#)
- 4) A. Al Harraq, R. Patel, **J.G. Lee**, O. Owoyele, J. Chun, B. Bharti, “Non-reciprocity, metastability, and dynamic reconfiguration in colloidal assembly”, *Advanced Sciences*, 2409489 (2024). [link](#)
- 5) **J.G. Lee**<sup>†</sup>, C. P. Thome<sup>†</sup>, Z. A. Cruze, A. Ganguly, A. Gupta, C.W. Shields IV, “Magnetically locked Janus particle clusters with orientation-dependent motion in AC electric fields”, *Nanoscale*, 15, 16268-16276 (2023). <sup>†</sup>equal contribution [link](#)
- 6) **J.G. Lee**<sup>†</sup>, R.R. Raj<sup>†</sup>, N.B. Day<sup>†</sup>, C. Wyatt Shields IV, “Microrobots for biomedicine: Unsolved challenges and opportunities for translation”, *ACS Nano*, 17 (15), 14196-14204 (2023). <sup>†</sup>equal contribution [link](#)
- 7) A.J. Pete, **J.G. Lee**, M.G. Benton, B. Bharti, “Chitosan-Coated Lignin Nanoparticles Enhance Adsorption and Proliferation of *Alcanivorax borkumensis* at the Hexadecane–Water Interface”, *ACS ES&T Engineering*, 3 (9), 1339-1349 (2023). [link](#)
- 8) **J.G. Lee**, R.R. Raj, C.P. Thome, N.B. Day, P. Martinez, N. Bottenus, A. Gupta, and C.W. Shields IV, “Bubble-Based Microrobots with Rapid Circular Motions for Epithelial Pinning and Drug Delivery”, *Small*, 19, 2300409 (2023) [link](#) – Highlighted in Science Daily, Phys.org, EurekAlert! etc.
- 9) C.P. Thome, W.S. Hoertdoerfer, J.R. Bendorf, **J.G. Lee**, and C.W. Shields IV, “Electrokinetic Active Particles for Motion-Based Biomolecule Detection”, *Nano Letter*, 23 (6), 2379-2387 (2023). [link](#)
- 10) **J.G. Lee**, A.A. Harraq, K.J.M. Bishop, and B. Bharti, “Fabrication and Electric Field-Driven Active Propulsion of Patchy Microellipsoids”, *The Journal of Physical Chemistry B*, 125 (16), 4232-4240 (2021). [link](#)
- 11) **J.G. Lee**,<sup>†</sup> Y. Guo,<sup>†</sup> J.A. Belgodere, A.A. Harraq, A.A. Hymel, A.J. Pete, K.T. Valsaraj, M.G. Benton, M.G. Miller, J.P. Jung, and B. Bharti, “Lignin-Zein Composite: Synthesis, 3D printing and microbial degradation”, *ACS Sustainable Chemistry & Engineering*, 9 (4), 1781-1789 (2021). <sup>†</sup>equal contribution [link](#)
- 12) N.P. Holley, **J.G. Lee**, K.T. Valsaraj, and B. Bharti, “Synthesis and characterization of Zein-based Low Density Porous Absorbent (ZELDA) for oil spill recovery”, *Colloids and Surfaces A: Physicochemical and Engineering Aspect*, (614), 126148 (2021). [link](#)
- 13) **J.G. Lee**, K. Lannigan, W.A. Shelton, J. Meissner, B. Bharti, “Adsorption of myoglobin and corona formation on silica nanoparticles”, *Langmuir*, 36 (47), 14157-14165 (2020). [link](#)
- 14) A.A. Harraq, **J.G. Lee**, and B. Bharti, “Magnetic field driven assembly and reconfiguration of multicomponent of supraparticles”, *Science Advances*, Vol.6, no. 19, eaba5337 (2020). [link](#)
- 15) Y. Ma, Y. Wu, **J.G. Lee**, L. He, G. Rother, A.L. Fameau, W.A. Shelton, and B. Bharti, “Adsorption of Fatty Acid Molecules on Amine-Functionalized Silica Nanoparticles: Surface Organization and Foam Stability”, *Langmuir*, 36 (14), 3703-3712 (2020). [link](#)
- 16) **J.G. Lee**, A.M. Brooks, K.J.M. Bishop, W.A. Shelton, B. Bharti, “Directed Propulsion of Spherical Particles along three dimensional Helical Trajectories”, *Nature Communications*, 10, 1, 2575, (2019). [link](#) – Highlighted in *Nature Nanotechnology* (2019 July issue), Yahoo News, BioMed Report, Morning Star etc.

- 17) **J.G. Lee**, L.L Larive, K.T. Valsaraj, B. Bharti, “Binding of Lignin Nanoparticles at Oil-Water Interfaces: An Ecofriendly Alternative to Oil Spill”, *ACS Applied Materials & Interfaces*, 10 (49), 43282-43289 (2018). [link](#)
- 18) **J.G. Lee**, V. Porter, W. A. Shelton, B. Bharti, “Magnetic Field-Driven Convection for Directed Surface Patterning”, *Langmuir*, 34 (50), 15416-15424 (2018). [link](#)

*Manuscript under review*

**J.G. Lee\*** and C.W. Shields IV\*, “Bridging the Gap: Revisiting Colloid Science for Biomedicine”, invited Perspective, under review in *ACS Nano Medicine*, \*Corresponding authors

## PATENTS

- 1) Shields IV, C.W.; Lee, J.G., “Biodegradable dendritic particles for sustained drug release” U.S. Patent App. No.: 63/451,987. Filed March 14, 2024.
- 2) Bharti, B; Lee, J.G. “Lignin composition, methods of making and using the composition for adsorption onto petrochemical oil and oil removal”, U.S. patent number 11866633, Granted January 9, 2024. [link](#)

## RESEARCH PRESENTATIONS

### Departmental Seminars

- Kumoh National Institute of Technology. Department of Polymer Science and Engineering (2025, August)
- University of Colorado Boulder. Department of Chemical and Biological Engineering (2023, October)
- Korea Advanced Institute of Science and Technology. Department of Chemical & Biomolecular Engineering (2023, August)
- Louisiana State University. Cain Department of Chemical Engineering (2020, October)

**Contributed Talks > 30** at American Institute of Chemical Engineers (AIChE), ACS Colloid and Surface Science Symposium (ACS Colloids), ACS Meeting

## SERVICE

- Peer review activity: *Journal of Colloid and Interface Science*, *Soft Matter*, *Bioengineering & Translation Medicine*, *Bioresource Technology*, *Environmental Science and Ecotechnology*, *Device*, *ASSAY and Drug Development Technologies*, *RSC Advances*, *ACS Omega*
- Outreach: Northglenn High School Senior Capstone Mentorship (2022-2023), ENGage LSU (2017-2019)