BHUVNESH BHARTI

Cain Department of Chemical Engineering,
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PROFESSIONAL EXPERIENCE

2016-present	*Assistant Professor,* Cain Department of Chemical Engineering, Louisiana State University, Baton Rouge
2012-2016	*Postdoctoral Research Associate*, Chemical and Biomolecular Engineering, NC State University, Raleigh
2014	*Postdoctoral Research Associate*, Environmental Engineering, Shinshu University, Nagano, Japan
2009-2012	*Graduate Research Assistant*, Institut für Chemie, Stranski Laboratorium, Technische Universität, Berlin, Germany
2008-2009	*Research Assistant*, Department of Chemistry, Panjab University, Chandigarh, India

EDUCATION

2009-2012	*Ph,D.* – Physical Chemistry, Institut für Chemie, Stranski Laboratorium, Technische Universität, Berlin, Germany
2007-2009	*Master of Science* (Honors School) Department of Chemistry, Panjab University, Chandigarh, India
2004-2007	*Bachelor of Science* (Honors School) Department of Chemistry, Panjab University, Chandigarh, India

RESEARCH INTERESTS

Nanoscience, colloid and interface science, bio-nano interactions, soft matter, directed and self-assembly, active materials, and non-equilibrium assemblies.

ACADEMIC ACHIEVEMENTS AND AWARDS

- LSU Alumni Association Rising Faculty Award – **2021**
- Faculty Early Career Development Award (CAREER) by National Science Foundation – **2020**
- Dow Chemical Excellence in Teaching Award (Chemical Engineering, LSU) – **2019, 2020**
- Doctoral Young Investigator Award by American Chemical Society – Petroleum Research Funds (ACS – PRF) – **2019**
- Economic Development Assistantship Award (Graduate School, LSU) – **2018**
- Postdoctoral Fellowship Award by Japan Society for the Promotion of Science (JSPS) – **2014**
- *Springer Theses Award* to the doctoral thesis – **2014**
- 2nd prize for poster presentation (Postdoc. category) in 127th North Carolina ACS local section conference – **2013**
- Travel Grant Award for Young Scientists to attend IACIS conference in Sendai, Japan – **2012**
- Graduate Aptitude Test in Engineering (GATE, India) 96 percentile – **2009**
- CSIR-NET for Junior Research Fellowship (JRF) by Government of India – **2008** and **2009**

FUNDING AND SUPPORT

- PI – National Science Foundation (NSF-ENG-CBET) – "Magnetic interactions for selective assembly and reconfiguration of colloids" ($296k) – **2021-2024**
- PI – National Science Foundation (NSF-ENG-CBET) – Faculty Early Career Development Program, "CAREER: Helical propulsion for tunneling through porous membranes" ($556k) – **2020-2025**
- PI – National Science Foundation (NSF-MPS-ECS) – Early Concept Grants for Exploratory Research, "CAS-MNP: Understanding the Dispersibility of Aging Micro/Nanoplastics" ($248k) – **2020-2022**
- PI – Louisiana Board of Regents (BoR) – Proof-of-Concept/Prototype (P-o-C/P) Initiative, "Ecofriendly and cost-effective alternative for oil spill cleanup" ($40k) – **2020-2021**
- PI – American Chemical Society - Petroleum Research Fund (ACS-PRF) – "Understanding the effect of nanoconfinement on the assembly and temperature induced demixing of surfactants" ($110k) – **2019-2022**
- PI – LSU LIFT^2 Board of Supervisors – "Lignin nanoparticles as an ecofriendly and cost-effective alternative for oil spill recovery" ($50k) – **2019-2021**
- co-PI – Department of Energy (DOE) – Louisiana Consortium for Neutron Scattering (LaCNS) "Soft matter mediated binding of hard(er) nanoparticles: SANS for understanding the nanocapillary bridging of particles" ($3.8M, $300k to Bharti) – **2018-2020**
- PI – Louisiana Economic Development Assistantship by Graduate School LSU – "Finding cost-effective ecofriendly alternatives for oil spill remediation: Lignin based dispersants for oil herding technology" ($100k, no overhead or tuition) – **2018-2022**
- PI – Chevron Innovative Research Funds, Round VII – "Lignin nanoparticles: A new class of ecofriendly dispersant for enhanced oil recovery" ($48k) – **2018-2019**
- co-PI – National Science Foundation– (NSF-ENG-CBET): Particulate and Multiphase processes, "Establishing the principles and demonstrating the unique properties of novel reconfigurable nano- and microparticle structures bound by liquid bridges" ($293k, $27k to Bharti) – **2016-2020**
- Fellowship in Research Triangle Material Research and Engineering Center (RT-MRSEC) by National Science Foundation (NSF) – **2012-2016**
- Postdoctoral fellowship by Japan Society for the Promotion of Science (JSPS) – **2014**
- Doctoral fellowship award in International Research Training Group (IRTG-1524) by Deutsche forschungsgemeinschaft (DFG) – **2009-2012**

RESEARCH MENTORSHIP

- Group members at LSU
    - Visiting researcher: One (Fulbright scholar from Argentina)
    - Graduate students: Eight
    - Undergraduate students: Eight
- Group alumni
    - Undergraduate students: Nine
    - High school student: Two
- Mentees before joining LSU
    - Graduate students: Two at NCSU, one at Shinshu University, one at TU Berlin
    - Undergraduate students: One at NCSU, one at TU Berlin

PROFESSIONAL ORGANIZATIONS

- American Chemical Society (ACS)
- American Institute of Chemical Engineers (AIChE)
- American Association for the Advancement of Science (AAAS)

PEER REVIEWING/CONFERENCE SESSION CHAIRS

- Invited reviewer of articles submitted to *Nature Communications*, *Science Advances*, *Adv. Funct. Mater.*, *Nanoscale*, *J. Am. Chem. Soc.*, *J. Mater. Chem.*, *Langmuir*, *Chem. Commun.*, *Soft matter, New J. Chem., J. Coll. Inter. Sci.,* etc.
- Panel reviewer for NSF, and mail-in reviewer for ACS – PRF
- PhD thesis reviewer for students at Technishe Universitaet Berlin (2017), and Australian National University (2018).
- Session organizer: ACS Colloids & Surface Science Symposium – 2020, 2019; AIChE – 2020, 2019, 2018, 2017; RAMC conference – 2016
- Session chair at 90th, and 88th ACS Colloid and Surface Science Symposium – 2017, 2016, 2014; AIChE – 2019, 2018, 2017.

TEACHING

- Chemical Engineering Thermodynamics (ChE – 3172) – Fall 2016 (Enrollment: 210), Fall 2017 (Enrollment: 160); Fall 2018 (Enrollment: 135); Fall 2019 (Enrollment: 80); Fall 2020 (Enrollment: 62)
- Teaching: Designed a new course entitled “Colloids and Interfacial Engineering” (ChE – 4425, and ChE – 7700) – Spring 2018 (Enrollment: 80), Spring 2019 (Enrollment: 102); Spring 2020 (Enrollment: 103)

OUTREACH AND SERVICES

- Currently member of Graduate Committee, and Awards, Seminars and Events Committee in the Cain Department of Chemical Engineering at LSU
- Member of graduate student thesis award committee at College of Engineering 2019
- Develop new event for visually impaired students at Louisiana School of Visually Impaired. 2017-present
- Recruitment of underprivileged students from Baton Rouge Community College by bisemester visits and interactions. 2017-present
- New demonstration entitled “Confused Colloids and Mad Magnetic Materials” developed for middle school students participating in LSU ENGage program – 2017-present
- Invited talk entitled “*Sandcastle-like future nanomaterials*” for general public at Nature Research Center, North Carolina Museum of Natural Sciences, Raleigh, NC – Sept. 2014
- Invited judge for the North Carolina School of Science and Mathematics (NCSSM) Regional Science Fair – Feb. 2015, and summer Research Experience for Undergraduates (REU) symposium at Duke University – July 2015

RESEARCH PRESENTATIONS

Invited departmental seminars:

- Clemson University (Chemical Engineering) – Spring 2021
- Louisiana State University (Biological Chemistry) – Spring 2021
- Tulane University (Chemical Engineering) – Fall 2019
- Pacific Northwestern National Laboratory (Materials Science) – Fall 2019
- University of Washington (Chemical Engineering) – Fall 2019
- Louisiana State University (Petroleum Engineering) – Spring 2019
- University of Rhode Island (Chemical Engineering) – Fall 2018
- University of Arkansas (Chemical Engineering) – Spring 2018
- Louisiana State University (Louisiana Center for Neutron Scattering) – Spring 2017

Invited keynote speaker at conferences:

- Gordon Research Conference on Colloidal, Macromolecular and Polyelectrolyte Solutions – Spring 2020
- Glass and Optical Materials Division Annual Meeting (GOMD) – Spring 2020
- Southeast Symposium on Contemporary Engineering Topics (SSCET) – Fall 2019
- Colloquim at International Reseach Rraining Group at Technical University Berlin – Fall 2017
- 4th Recent Advances in Microbial Control (RAMC) – Fall 2016
- ACS Southwest Regional Meeting – Fall 2016

Additional > 30 session talks:

- AIChE Annual conferences (2016, 2017, and 2019)
- ACS National Meetings (2017, 2018)
- ACS Colloids and Surface Science Symposium (2016, 2017, and 2019)
- Other conferences

PATENT

1. B. Bharti, J. G. Lee, “Lignin Composition, Methods of Making and Using the Composition for adsorption onto Petrochemical Oil and Oil Removal from Water Surface” **2018**, International patent application No. PCT/US2019/54430.

PUBLICATIONS

Google Scholar Link

At LSU (*corresponding author)

Under review

1. A. Al Harraq, A. A. Hymel, B. Bharti*, “Dynamic and competitive interactions via the ‘dual nature’ of ferrofluids”
2. N. I. Castellanos, B. Bharti, O. D. Velev, “Field-driven reversible alignment and gelation of magneto-responsive soft anisotropic microbeads”

Published

1. A.-L. Fameau*, Y. Ma, M. Siebenburger, B. Bharti*, “Foamitizer: High ethanol content foams using fatty acid crystalline particles” *J. Coll. Interf. Sci.* **2021**, *Accepted*, DOI: 10.1016/j.jcis.2021.05.076 Link
2. A. J. Pete, B. Bharti*, M. G. Benton*, “Nano-enhanced bioremediation for oil spills: A review” *ACS ES&T Eng.* **2021**, *Accepted*, DOI: 10.1021/acsestengg.0c00217 Link
3. J. G. Lee, A. A. Harraq, K. J. M. Bishop, B. Bharti*, “Fabrication and electric field-driven propulsion of patchy microellipsoids” *J. Phys. Chem. B* **2021**, *125*, 4232-4240. Link – *Invited article*
4. J. G. Lee, Y. Guo, J. A. Belgodere, A. Al Harraq, A. A. Hymel, A. J. Pete, K. T. Valsaraj, M. G. Benton, M. G. Miller, J. P. Jung, B. Bharti*, “Lignin-Zein Composite: Synthesis, 3D printing and microbial degradation” *ACS Sustain. Chem. Eng.* **2021**, *9*, 1781-1789. Link
5. N. P. Holley, J. G. Lee, K. T. Valsaraj*, B. Bharti*, “Synthesis and characterization of ZEin-based Low Density porous Absorbent (ZELDA) for oil spill recovery” *Colloids Surf. A Physicochem. Eng. Asp.* **2021**, *614*, 126148 (1-10). Link
6. Y. Ma, W. T. Heller, L. He, W. A. Shelton, G. Rother, B. Bharti*, “Characterisation of nano-assemblies inside mesopores using neutron scattering” *Molecul. Phys.* **2021** e1905190 (1-10). Link – *Invited article*
7. J. G. Lee, K. Lannigan, W. A. Shelton, J. Meissner, B. Bharti*, “Adsorption of myoglobin and corona formation on silica nanoparticles” *Langmuir* **2020**, *36*, 14157-14165. Link
8. A. Al Harraq, B. Bharti*, “Onset and suppression of buckling in drying suspensions of rod-shaped particles” *Soft Matter* **2020**, *16*, 9643-9647. Link – **Journal cover**
9. A. Al Harraq, J. G. Lee, B. Bharti*, “Magnetic field driven assembly and reconfiguration of multicomponent supraparticles”, *Science Advances*, **2020**, *6*, eaba5337. Link
10. K. Han, C. W. Shields IV, B. Bharti, P. Arratia, O.D. Velev*, “Active Reversible Swimming of Magnetically Assembled Microscallops in Non-Newtonian Fluids”, *Langmuir*, **2020**, *36*, 7148-7154. Link
11. Y. Ma, Y. Wu, J. Lee, L. He, G. Rother, A-L. Fameau, W. A. Shelton, B. Bharti*, "Adsorption of Fatty Acid Molecules on Amine Functionalized Silica Nanoparticles: Surface Organization and Foam Stability", *Langmuir*, **2020**, *36*, 3703-3712. Link
12. J. G. Lee, A. M. Brooks, W. A. Shelton, K. J. M. Bishop, B. Bharti*, “Directed Propulsion of Spherical Particles Along Three-Dimensional Helical Trajectories”, *Nature Commun.*, **2019**, *10*, 1, 2575. Link – Highlighted in *Nature Nanotechnol.* **2019**, *14*, 638 - Link, Yahoo News, BioMed Reports, Morning Star etc.
13. Y. Guo, J. A. Belgodere, Y. Ma, J. P. Jung, B. Bharti*, “Directed Printing and Reconfiguration of Thermoresponsive Silica-pNIPAM Nanocomposites”, *Macromol. Rapid Commun.*, **2019**, *40*, 1900191 (1-9). Link – **Journal cover**
14. Y. Wu, Y. Ma, L. He, G. Rother, W. A. Shelton, B. Bharti*, “Directed Pore Uptake and Phase Separation of Surfactant Solutions under Confinement”, *J. Phys. Chem. C*, **2019**, *123*, - 9957-9966. Link
15. J. Meissner, Y. Wu, J. Jestin, W. A. Shelton, G. H. Findenegg*, B. Bharti*, “pH-Induced Reorientation of Cytochrome C on Silica Nanoparticles”, *Soft Matter*, **2019**, *15*, 350-354. Link – **Journal cover**
16. A.-L. Fameau*, B. Bharti, O. D. Velev, “Smart soft materials based on fatty acids”, *Inform*, **2019**, *30* (15), 17-23. Link

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 Recovery", *ACS Appl. Mater. Interfaces*, **2018**, *10*, 43282-43289. Link
18. J. G. Lee, V. Porter, W. A. Shelton, B. Bharti*, "Magnetic Field-Driven Convection for Directed Surface Patterning of Colloids", *Langmuir* **2018**, *34*, 15416-15424. Link
19. S. Roh, D. P. Parekh, B. Bharti, S. D. Stoyanov, O. D. Velev*, "Three-Dimensional Printing by Multiphase Silicone/Water Capillary Inks", *Adv. Mater.*, **2017**, *29*, 1701554 (1-7). Link
20. O. I. Bernal, B. Bharti, M. C. Flickinger, O. D. Velev*, "Fabrication of Photoreactive Biocomposite Coatings via Electric Field Assisted Assembly of Cyanobacteria", *Langmuir*, **2017**, *33*, 5304-5313. Link
21. B. Bharti*, D. Rutkowski, K. Han, A. U. Kumar, C. K. Hall, O. D. Velev*, "Capillary Bridging As a Tool for Assembling Discrete Clusters of Patchy Particles", *J. Am. Chem. Soc.*, **2016**, *138*, 14948-14953. Link – *J. Am. Chem. Soc.* spotlight, **2016**, *138*, 15510.

Prior to joining LSU

22. K. Han, C. W. Shields, N. M. Diwakar, B. Bharti, G. P. Lopez, O. D. Velev*, "Sequence-Encoded Colloidal Origami and Microbot Assemblies From Patchy Magnetic Cubes", *Sci. Adv.*, **2017**, *3*, e1701108 (1-6). Link
23. B. Bharti, F. Kogler, C. K. Hall, S. H. L. Klapp, O. D. Velev*, "Multidirectional Colloidal Assembly in Concurrent Electric and Magnetic Fields", *Soft Matter*, **2016**, *12*, 7747-7758. Link – Journal cover
24. A.P. Richter, B. Bharti, H. Armstrong, J. S. Brown, D. Plemmons, V. N. Paunov, S. D. Stoyanov, O. D. Velev*, "Synthesis and Characterization of Biodegradable Lignin Nanoparticles with Tunable Surface Properties", *Langmuir*, **2016**, *32*, 6468-6477. Link
25. D. Morales, B. Bharti, M. D. Dickey, O. D. Velev*, "Directional Bending of Responsive Hydrogel Sheets Guided by Field-Assembled Microparticle Endoskeleton Structures", *Small*, **2016**, *12*, 2283-2290. Link
26. B. Bharti, A.-L. Fameau, M. Rubinstein, O. D. Velev*, "Nanocapillarity-mediated Magnetic Assembly of Nanoparticles into Ultraflexible Filaments and Reconfigurable Networks" *Nature Mater.*, **2015**, *14*, 1104-1109. Link – Highlighted in Science Daily, Scicasts, NSF homepage, ChemEurope etc…
27. A. P. Richter, J. S. Brown, B. Bharti, A. Wang, S. Gangwal, K. Houck, E. A. C. Hubal, V. N. Paunov, S. D. Stoyanov, O. D. Velev*, "An Environmentally Benign Antimicrobial Nanoparticle Based on Silver-infused Lignin Core" *Nature Nanotechnol.*, **2015**, *10*, 817-823. Link – Highlighted in C&E News, Azonano, IFLscience, specktrum.de, etc…
28. B. Bharti, O. D. Velev*, "Assembly of Reconfigurable Colloidal Structures by Multidirectional Field Induced Interactions" *Langmuir*, **2015**, *31*, 7897-7908. Link – ACS editors' choice, Journal cover
29. B. Bharti, O. D. Velev*, "Multi-directional, Multicomponent Electric Field Driven Assembly of Complex Colloidal Chains" *Z. Phys. Chem.*, **2015**, *229*, 1075-1088. Link
30. B. Bharti, A.-L. Fameau, O. D. Velev*, "Magnetophoretic Assembly of Flexible Nanoparticle/Lipid Microfilaments" *Faraday Discuss.*, **2015**, *181*, 437-448. Link
31. A. Ghoorchian, J. R. Simon, B. Bharti, W. Han, X. Zhao, A. Chilkoti, G. P. López*, "Bio-inspired Reversibly-crosslinked Hydrogels Comprising Polypeptide Micelles Exhibit Enhanced Mechanical Properties" *Adv. Funct. Mater.*, **2015**, *25*, 3122-3130. Link
32. J. Meissner, A. Prause, B. Bharti, G. H. Findenegg*, "Characterization of Protein Adsorption onto Silica Nanoparticles: Influence of pH and Ionic Strength", *Coll. Poly. Sci.*, **2015**, *293*, 3381-3391. Link

33. R. Kukobat, D. Minami, T. Hayashi, Y. Hattori, T. Matsuda, M. Sunaga, B. Bharti, K. Asakura, K. Kaneko*, "Sol-gel Chemistry Mediated Zn/Al-Based Complex Dispersant for SWCNT in Water Without Foam Formation" *Carbon*, **2015**, *94*, 518-523. Link
34. J. Meissner, A. Prause, C. D. Tommaso, B. Bharti, G. H. Findenegg*, "Protein Immobilization in Surface-functionalized SBA-15: Predicting the Uptake Capacity From the Pore Structure", *J. Phys. Chem. C*, **2015**, *119*, 2438-2446. Link
35. B. Bharti*, R. Kukobat, D. Minami, K. Kaneko*, "Modulating SWCNTs-silica Interactions for Enhanced Dispersibility and Hybrid Cryogel Formation" *Colloid Interface Sci. Commun.*, **2014**, *3*, 13-17. Link
36. B. Bharti, G. H. Findenegg, O. D. Velev*, "Analysis of the Field-assisted Permanent Assembly of Oppositely Charged Particles", *Langmuir*, **2014**, *30*, 6577-6587. Link
37. B. Bharti*, J. Meissner, S. H. L. Klapp, G. H. Findenegg*, "Bridging Interaction of Protein with Silica Nanoparticles: Influence of pH, Ionic Strength and Protein Concentration", *Soft Matter*, **2014**, *10*, 718-728. Link
38. C. W. Shields, S. Zhu, Y. Yang, B. Bharti, J. Liu, B. B. Yellen*, O. D. Velev*, G. P. López*, "Field-Directed Assembly of Patchy Anisotropic Microparticles with Defined Shape", *Soft Matter*, **2013**, *9*, 9219-9229. Link
39. B. Bharti, G. H. Findenegg*, O. D. Velev*, "Co-Assembly of Oppositely Charged Particles into Linear Clusters and Chains of Controllable Length", *Sci. Rep.*, **2012**, *2*, 1004 (1-5). Link
40. B. Bharti, M. Xue, J. Meissner, V. Cristiglio, G. H. Findenegg*, "Assembling Wormlike Micelles in Tubular Nanopores by Tuning Surfactant-Wall Interactions", *J. Am. Chem. Soc.*, **2012**, *134*, 14756-14759. Link
41. B. Bharti, G. H. Findenegg*, "Protein–specific Effects of Binding to Silica Nanoparticles", *Chem. Lett.*, **2012**, *41*, 1122-1124. Link
42. B. Bharti, J. Meissner, U. Gasser, G. H. Findenegg*, "Surfactant Adsorption and Aggregate Structure at Silica Nanoparticles: Effects of Particle Size and Surface Modification", *Soft Matter*, **2012**, *8*, 6573-6581. Link
43. S. K. Mehta*, S. Chaudhary, B. Bharti, M. Gradzielski, "Correspondence via Electron and Charge Carrier Dynamics of Silver Nanoparticles with Organic Dyes", *Sci. Adv. Mater.*, **2012**, *4*, 78-92. Link
44. B. Bharti, J. Meissner, G. H. Findenegg*, "Aggregation of Silica Nanoparticles Directed by Adsorption of Lysozyme", Langmuir, **2011**, 27, 9823-9833. Link

Book/Chapter(s)

- Book Title: "*Adsorption, aggregation and structure formation in systems of charged particles: From colloidal to supracolloidal assembly*"
  Author: B. Bharti
  Publisher: Springer International Publishing, ISBN: 978-3-319-07736-9
- Chapter Title: "*Principles of dielectrophoretic particle assembly and its application to fabricate permanent colloidal chains*"
  Book: Encyclopedia of Surface and Colloid Science (3rd edition)
  Authors: B. Bharti, G. H. Findenegg and O. D. Velev
  Editor: P. Somasundaran
  Publisher: Taylor and Francis Group, ISBN: 978-1-466-59045-8