

BHUVNESH BHARTI

Department of Chemical and Biomolecular Engineering
North Carolina State University,
911 Partners Way, EB I, Raleigh, NC 27695-7905
Tel: (919)-513-4648, bbharti@ncsu.edu

EDUCATION

- 2009-2012** **Technische Universität**, Berlin, Germany
Ph.D. – Physical Chemistry
Thesis title: “*Adsorption, Aggregation and Structure Formation in Systems of Charged Particles: From Colloidal to Supracolloidal Assembly*”
- 2007-2009** **Panjab University**, Chandigarh, India
Master of Science (Honours School) – Physical Chemistry
Thesis title: “*Tailoring the Optoelectronic Properties of Silver Nanoparticles Synthesized in Micellar Media*”
- 2004-2007** **Panjab University**, Chandigarh, India
Bachelor of Science (Honours School) – Chemistry

RESEARCH EXPERIENCE

- 2014-present** **North Carolina State University**, Raleigh, NC
Chemical and Biomolecular Engineering, Mentor: Prof. O. D. Velev
Research Assistant Professor
Established new methods of particle assembly into ultra-flexible and self-healing filaments by nanocapillary interactions
- 2014** **Shinshu University**, Nagano, Japan
Research Center for Exotic NanoCarbons, Advisor: Prof. K. Kaneko
JSPS Postdoctoral Research Associate
Designed new strategies for fabricating carbon nanotube hybrid materials for energy-efficient electrodes and conductive surface coatings.
- 2012-2014** **North Carolina State University**, Raleigh, NC
Chemical and Biomolecular Engineering, Advisor: Prof. O. D. Velev
Postdoctoral Research Associate
Achieved programmed assembly of colloidal particles into multiresponsive structures using external fields.
- 2009-2012** **Technische Universität**, Berlin, Germany
Institute for Chemistry, Advisor: Prof. G. H. Findenegg
Graduate Research Assistant
Investigated soft-to-hard matter interactions between globular proteins and inorganic nanoparticles.

2008-2009

Panjab University, Chandigarh, India
Department of Chemistry, Advisor: Prof. S. K. Mehta
Undergraduate Research Assistant

Developed new insights into the stabilization of silver nanoparticle with surfactants.

RESEARCH INTERESTS

Nanoscience, colloid and interface science, bio-nano interactions, soft matter, functional materials, directed and self-assembly

TEACHING EXPERIENCE AND STUDENT MENTORSHIP

- *Guest lecturer* for the undergraduate course *Chemical Process Thermodynamics* at NCSU – Fall 2015
- Physical chemistry *course instructor* (60 hours) for M.Sc.-Chemistry major students preparing for UGC-CSIR entrance test (India) – Summer 2009
- General chemistry *course instructor* (10 hours) for M.Sc.-Chemistry minor students preparing for UGC – CSIR entrance test (India) – Summer 2009
- *Private tutor* for several high school juniors and seniors – 2004-2009
- Graduate/undergraduate students mentored at various universities

Koohee Han	NC State Univ.	2013-present
Jens Meissner	TU Berlin	2009-present
Aakash Kumar	NC State Univ.	2013-2014
Radovan Kukobat	Shinshu Univ.	2014-2015
Ncami Maseko	NC State Univ.	2012-2013
Zachary Iszard	Texas State Univ.	2013
Shan Zhu	NC State Univ.	2012-2013

ACADEMIC ACHIEVEMENTS AND AWARDS

- *Springer Theses Award* to the doctoral thesis – 2014
- 2nd prize for poster presentation (Postdoc. category) in 127th North Carolina ACS local section conference – 2013
- All India Graduate Aptitude Test in Engineering (GATE) 95.1 percentile – 2009
- All India CSIR-NET for Junior Research Fellowship (JRF) – 2008 and 2009
- All India Rank 127 in Combined Entrance Test (CET) conducted by Panjab University –2004

FUNDING AND SUPPORT

- Fellowship in Research Triangle Material Research and Engineering Center (RT-MRSEC) by National Science Foundation (NSF) – 2012-present
- Short-term postdoctoral fellowship by Japan Society for the Promotion of Science (JSPS) – 2014
- Travel Grant Award for Young Scientists for attending IACIS conference in Sendai, Japan – 2012
- Doctoral fellowship award in International Research Training Group (IRTG-1524) by Deutsche forschungsgemeinschaft (DFG) – 2009-2012

B. Bharti curriculum vitae

- As PI: NSF – CBET: Particulate and Multiphase processes, “Nanoparticle structures held together by biphasic liquid: A new class of soft matter assembled by nanocapillary interactions” (\$ 304,000)
review commettie approved – not funded

Pending

- As co-PI: NSF – CBET: Particulate and Multiphase processes, “ Establishing the principles and demonstrating the unique properties of novel reconfigurable nano- and microparticle structures bound by liquid bridges” (\$ 290,000)

PEER REVIEWING/CONFERENCE SESSION CHAIRS

- Invited reviewer of articles/proposals submitted to *Chem. Commun.*, *Nanoscale*, *J. Am. Chem. Soc.*, *J. Mater. Chem.*, *Soft matter*, *New J. Chem.*, *J. Coll. Inter. Sci.*, *RSC Adv.*, *ACS –PRF* etc.
- Session chair at 88th ACS Colloid and Surface Science Symposium, Pennsylvania PA – June 2014

OUTREACH AND SERVICES

- 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, Durham, NC – Feb. 2015
- Invited judge for the summer Research Experience for Undergraduates (REU) symposium at Duke University, Durham, NC – July 2015

PROFESSIONAL ORGANIZATIONS

- American Chemical Society (ACS)
- American Institute of Chemical Engineers (AIChE)

PUBLICATIONS

Published journal articles

1. B. Bharti, A.-L. Fameau, M. Rubinstein, O. D. Velev, “Nanocapillarity-mediated Magnetic Assembly of Nanoparticles into Ultraflexible Filaments and Reconfigurable Networks” *Nat. Mater.*, **2015**, *14*, 1104-1109. [Link](#)
– Highlighted in Science Daily, Scicasts, NSF homepage, ChemEurope etc...
2. 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” *Nat. Nanotechnol.*, **2015**, *10*, 817-823. [Link](#)
– Highlighted in C&E News, Azonano, IFLscience, spektrum.de, etc...
3. B. Bharti, O. D. Velev, “Assembly of Reconfigurable Colloidal Structures by Multidirectional Field Induced Interactions” *Langmuir*, **2015**, *31*, 7897-7908. [Link](#)
– ACS editors’ choice, amongst top 20 most read papers (Feb. - April 2015), *Langmuir* cover
4. B. Bharti, O. D. Velev, “Multi-directional, Multicomponent Electric Field Driven Assembly of Complex Colloidal Chains” *Z. Phys. Chem.*, **2015**, *229*, 1075-1088. [Link](#)

B. Bharti curriculum vitae

5. B. Bharti, A.-L. Fameau, O. D. Velev, “Magnetophoretic Assembly of Flexible Nanoparticle/Lipid Microfilaments” *Faraday Discuss.*, **2015**, *181*, 437-448. [Link](#)
6. 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](#)
7. 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**, DOI: 10.1007/s00396-015-3754-x [Link](#)
8. 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](#)
9. 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](#)
10. 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](#)
11. 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](#)
12. 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](#)
13. 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](#)
14. 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](#)
15. 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](#)
16. B. Bharti, G. H. Findenegg, “Protein-specific Effects of Binding to Silica Nanoparticles”, *Chem. Lett.*, **2012**, *41*, 1122-1124. [Link](#)
17. 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](#)
18. 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](#)
19. B. Bharti, J. Meissner, G. H. Findenegg, “Aggregation of Silica Nanoparticles Directed by Adsorption of Lysozyme”, *Langmuir*, **2011**, *27*, 9823-9833. [Link](#)

Article(s) under review

1. D. Morales, B. Bharti, M. D. Dickey, O. D. Velev, “Directional Bending of Responsive Hydrogel Sheets Guided by Field-Assembled Microparticle Endoskeleton Structures”, *Small*

B. Bharti curriculum vitae

2. A.P. Richter, B. Bharti, H. Armstrong, J. S. Brown, D. Plemmons, A. K. Sarkar, V. N. Paunov, S.D. Stoyanov, O. D. Velev, “Lignin nanoparticles: Development of new biodegradable colloids with tunable surface properties”, *ACS Nano*

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 title: Encyclopedia of Surface and Colloid Science
Authors: B. Bharti, G. H. Findenegg and O. D. Velev
Editor: P. Somasundaran
Publisher: Taylor and Francis Group, ISBN: 978-1-466-59045-8

RESEARCH PRESENTATIONS

Invited talks

1. B. Bharti “*Probing Soft-Condensed Matter by Scattering*”, SAXS Interest Meeting at Duke University, Durham, NC – March 2013
2. B. Bharti, J. Meissner, G.H. Findenegg “*Adsorption, Aggregation and Structure Formation in Systems of Charged Particles: From Colloidal to Supracolloidal Assembly*” on the occasion of on-site review of International Research Training Group (IRTG-1524) by Deutsche forschungsgemeinschaft (DFG) at Technische Universität Berlin, Germany – Feb. 2013

Conference talks

1. B. Bharti, D. Rutkowski, A. Kumar, K. Han, C. K. Hall, O. D. Velev “*Directing colloidal assembly of patchy spheres by capillary interactions*” ACS General Fall Meeting, Boston, MA – Aug. 2015
2. B. Bharti, J. Meissner, A.-L. Fameau, M. Rubinstein, G. H. Findenegg, O. D. Velev “*Nanocapillary binding of particles: A generic approach for assembling reconfigurable structures at nanoscale*” ACS General Fall Meeting, Boston, MA – Aug. 2015
3. B. Bharti, J. Meissner, G.H. Findenegg “*Protein adsorption on nanocurved surfaces: Investigating the nano-bio interactions by small angle scattering*” ACS General Fall Meeting, Boston, MA – Aug. 2015
4. B. Bharti, K. Han, C. W. Shields IV, G. P. López, O. D. Velev “*Programmed assembly of patchy microcubes into self-reconfiguring reversibly-actuating structures*”, 89th ACS Colloids and Surface Science Symposium, Pittsburgh, PA – June 2015
5. B. Bharti, A.-L. Fameau, A. Kumar, K. Han, M. Rubinstein, O. D. Velev “*Capillary interactions: A versatile tool for binding particles at all scales*”, 89th ACS Colloids and Surface Science Symposium, Pittsburgh, PA – June 2015
6. B. Bharti, G. H. Findenegg, O. D. Velev “*Tuning the morphology of surfactant aggregates at nanoscale solid/liquid interfaces*”, AIChE Annual Meeting in Atlanta, GA – Nov. 2014
7. B. Bharti, A.-L. Fameau, M. Rubinstein, O. D. Velev “*Assembling self-repairing ultra-flexible magnetic filaments and networks*”, AIChE Annual Meeting in Atlanta, GA – Nov. 2014

B. Bharti curriculum vitae

8. B. Bharti, J. Meissner, G. H. Findenegg “*Bridging interactions of proteins with silica nanoparticles*”, AIChE Annual Meeting in Atlanta, GA – Nov. 2014
9. B. Bharti, A.-L. Fameau, M. Rubinstein, O. D. Velev “*Reconfigurable self-repairing magnetic chains bound by nanocapillary interactions*” 88th ACS Colloids and Surface Science Symposium, Philadelphia, PA – June 2014
10. B. Bharti, J. Meissner, G. H. Findenegg “*Bridging interactions of proteins with silica nanoparticles*” 88th ACS Colloids and Surface Science Symposium, Philadelphia, PA – June 2014
11. B. Bharti, A.-L. Fameau, G. H. Findenegg, O. D. Velev “*External Field Directed Co-Assembly of Rigid and Ultra-Flexible Permanent Chains*” AIChE Annual Meeting in San Francisco, CA – Nov. 2013
12. B. Bharti, S. Zhu, N. Maseko, O. D. Velev “*Assembling two-directionally percolated particle networks using orthogonal electric and magnetic fields*” 87th ACS Colloids and Surface Science Symposium, Riverside, CA – June 2013
13. B. Bharti, G. H. Findenegg, O. D. Velev “*Directed co-assembly of heteroaggregating particles into permanent chains of tunable length*” 87th ACS Colloids and Surface Science Symposium, Riverside, CA – June 2013
14. B. Bharti, G. H. Findenegg “*Tuning the Morphology of Surfactant Surface Aggregates*” 87th ACS Colloids and Surface Science Symposium, Riverside, CA – June 2013
15. B. Bharti, A.L. Fameau, O. D. Velev “*Ultra-flexible permanent magnetic chains with soft-connectors*” 5th Annual Triangle Soft Matter Workshop, Durham, NC – May 2013
16. B. Bharti, G. H. Findenegg, O. D. Velev “*Linear Assembly of Oppositely Charged Particles Induced by Electric Field*” International Association of Colloids and Interface Scientists (IACIS) conference, Sendai, Japan – May 2012
17. B. Bharti, J. Meissner, G. H. Findenegg “*Protein-Specificity in Binding to Silica Nanoparticles*” ACS General Fall Meeting, Division of Colloid and Surface Chemistry, Denver, CO – Aug. 2011
18. B. Bharti, J. Meissner, G. H. Findenegg “*Protein-Induced Aggregation of Silica Nanoparticles*” at Process Net Jahrestreffen der Fachausschüsse Partikelmesstechnik & Grenzflächen-bestimmte Systeme und Prozesse, Clausthal-Zellersfeld, Germany – March 2011

Poster presentations

1. B. Bharti, C. K. Hall, S. Zauscher, M. Rubinstein, O. D. Velev “*Reconfigurable assembly of colloids: Capillary binding at nano- and microscale*” 7th Annual Triangle Soft Matter Workshop, Raleigh, NC – May 2015
2. B. Bharti, R. Kukobat, D. Minami, K. Kaneko “*Modulating silica-SWCNTs interactions for enhanced dispersion stability and hybrid material formation*” AIChE Annual Meeting in Atlanta, GA – Nov. 2014
3. B. Bharti, F. Kogler, S. H. L. Klapp, O. D. Velev “*Assembly of two-directionally percolated particle networks using orthogonal electric and magnetic fields*” 88th ACS Colloids and Surface Science Symposium, Philadelphia, PA – June 2014
4. B. Bharti, A.-L. Fameau, O. D. Velev “*Fatty acid mediated assembly of ultraflexible magneto-responsive chains: Evidence of nanocapillary forces*” Gordon Research Conference (GRC) and Gordon Research Seminar (GRS): Colloidal, Macromolecular and Polyelectrolyte Solutions, Ventura, CA – February 2014
5. B. Bharti, J. Meissner, G. H. Findenegg “*Aggregation of Silica Nanoparticles in the Presence of Lysozyme*” at Nanoscopic Colloid and Surface Science (NCSS), Chiba, Japan– September 2010