

Astha Garg

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PROFILE

3.5 years of experience in experiments to manipulate surface interactions using electric fields, salt and chemical reactions. Expertise in zeta potential characterization, optical and confocal video microscopy and image processing. Experienced with polymeric particle synthesis, 3D printing, microfluidics, SEM and EDS.

EDUCATION

Doctor of Philosophy, Chemical Engineering, expected December 2016
Pennsylvania State University, University Park, PA
Advisor: Prof. Darrell Velegol
GPA: 3.96/4

Bachelor of Technology, Chemical Engineering; Minor: Energy, May 2011
Indian Institute of Technology, Bombay (India)
GPA: 7.33/10

PUBLICATIONS

- ✦ S. Das, **A. Garg**, A. I. Campbell, J. Howse, A. Sen, D. Velegol, R. Golestanian and S. J. Ebbens, *Boundaries can Steer Active Janus Spheres*. Nature Communications, 6:8999 (2015).
- ✦ D. Velegol, **A. Garg**, R. Guha, A. Kar, M. Kumar, *Concentration Gradient Generation for Diffusiophoretic Transport*, Soft Matter, 12, 4686 (2016).
- ✦ **A. Garg**, C. Cartier, K. Bishop, D. Velegol, *Particle Zeta Potentials Remain Finite in Saturated Salt Solutions* (submitted).
- ✦ **A. Garg**, J. Wu, R. Guha, D. Velegol, *Diffusiophoresis Occurs even at High Salt* (in preparation).

RELATED EXPERIENCE

THESIS RESEARCH

A device to measure zeta potential at high ionic strength

- ✦ Filed a provisional patent application to the USPTO based on a device to measure zeta potential up to saturation, applicable to polymeric particles, oil emulsions and biological cells.
- ✦ Experiments and Monte-Carlo simulations provide insight into the angstrom scale electrical double layer close to saturated salt conditions.
- ✦ Currently working on characterizing concentration-gradient driven flows at high ionic strength, where they are often thought to be negligible but our measurements have clearly indicated to the contrary.

Controlling porosity generation through mineral replacement reactions

- ✦ Mineral replacement reactions such as petrification of wood are driven by fluid flows which result in porosity in the starting mineral. We are trying to understand and control these flows to control the porosity generated, in collaboration with Halliburton.

Measurement of zeta potential non-uniformity of active microparticles

- Measured zeta potential of each end of active platinum/polystyrene Janus particles using video microscopy rotational electrophoresis, in order to estimate the electrostatic contribution to their interaction with a wall.

INTERNSHIP

Research Intern, BASF SE, Ludwigshafen, Germany

October 2011 – April 2012

- Formulated and simulated a lattice model in FORTRAN to study the effect of liquid maldistribution on separation performance in distillation columns with sheet structured packings.

PRESENTATIONS

- A. Garg**, C. Cartier, K. Bishop, D. Velegol, *Finite Zeta Potential at High Ionic Strength*. ACS Colloid and Surface Science Symposium, 2016 (Talk).
- A. Garg**, C. Cartier, K. Bishop, D. Velegol, *Zeta Potential at High Ionic Strength*. Colloidal, Macromolecular & Polyelectrolyte Solutions. Gordon Research Conference (GRC), 2016 (Poster).
- A. Garg**, A. K. Van Dyk, D. Velegol, *Particle-surface adhesion in presence of electrosteric repulsion*. Colloidal, Macromolecular & Polyelectrolyte Solutions. Gordon Research Conference (GRC), 2014 (Poster).

LEADERSHIP EXPERIENCE

LABORATORY SAFETY

- Laboratory safety chief, Velegol lab**
Was recognized with the Prevention of Accidents With Safety Student of the Month award for bringing the lab to full compliance of safety guidelines, keeping weekly records and certifications. Worked with lab members to make safety an important consideration in planning and carrying out experiments in the lab.

COMMUNITY SERVICE

- Overall Project Coordinator, Association for India's Development, (AID) Penn State Chapter**
Worked with grassroots NGO's in India and AID Penn State to present and approve funding proposals for developmental projects in India.
- Cultural Councilor, IIT Bombay**
Was awarded the Hostel Organizational Color for exceptional contribution to the cultural scene as Music and Dance Secretary and later, as Cultural Councilor of the undergraduate girl's hostel.

HOBBIES

I enjoy fiddling with colloid chemistry in the kitchen (cooking), learning new dance forms and hiking in my free time.

REFERENCES

- Prof. Darrell Velegol, Pennsylvania State University (Thesis advisor)
- Prof. Kyle Bishop, Columbia University
- Prof. Ayusman Sen, Pennsylvania State University