Astha Garg

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PROFILE

3+ years of experience in designing and conducting experiments to study colloidal interactions and electrokinetic effects in formulation and on surfaces. Expertise in zeta potential characterizaion, optical video microscopy and image processing, and experience with 3D printing, microfluidics and electron microscopy.

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*. Nat. Commun., 2015.
- D. Velegol, **A. Garg**, R. Guha, A. Kar, M. Kumar, *Concentration Gradient Generation for Diffusiophoretic Transport*, Soft Matter, 2015.
- **A. Garg**, C. Cartier, K. Bishop, D. Velegol, *Zeta Potential of Polymeric Particles at High Ionic Strength*. (in preparation).

RELATED EXPERIENCE

THESIS RESEARCH

Electrokinetics at high ionic strength

- Measured zeta potential of low density contrast particles up to saturation in monovalent salts (5 M NaCl) showing for the first time that these potentials are significant (~-20 mV).
- Measurements at high ionic strength are relevant to understanding electrokinetic effects and stability of colloids in geological reservoirs, marine environments and biological systems.
- The technique is applicable to polymeric particles, oil emulsions and biological cells and uses a cheap, disposable electrophoretic cell combined with high speed video microscopy.

Material exchange in mineral replacement reactions

- Presently working on quantifying and controlling fluid flows, especially electrokinetic flows in dissolution, precipitation and mineral transformations reactions.

Zeta potential non-uniformity of active microparticles

- Measured zeta potential of each end of active platinum/polystyrene Janus particles using video microscopy rotational electrophoresis for the first time, in order to estimate the electrostatic contribution to their interaction with a wall.
- Currently using microfluidics to understand their behavior in fuel gradients.

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.
- The calculation proceeds from top to the bottom of the column, calculating the liquid flow based on observed hydrodynamics, vapor flow and a fitted mass transfer based on kinetics.

PRESENTATIONS

- **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**, C. Cartier, K. Bishop, D. Velegol, *Zeta Potential of Polymeric Particles at High Ionic Strength*. Penn State Chemical engineering Research Symposium, 2015 (Talk).
- **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 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.