



Cullen R. Buie

GRFP Recipient: 2003

Undergraduate Institution:
B.S. 2003, The Ohio State
University

Graduate Institution:
M.S. 2005, Ph.D. 2009; Stanford
University

Graduate Field of Study:
Mechanical Engineering

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Current Position:
Assistant Professor, Mitsui
Career Development Chair,
Department of Mechanical
Engineering, Massachusetts
Institute of Technology

RESEARCH INTERESTS //

Buie's research mission falls into two general fields, Microfluidic Microbiology and Electrokinetic Manufacturing. Microfluidics, the manipulation of fluids and particles with length scales of 1-100 μm , offers the ideal platform to analyze microorganisms approaching single cell resolution. Professor Buie's group utilizes two microfluidic phenomena, electrophoresis and dielectrophoresis, to manipulate and simultaneously characterize cell populations. They have invented low cost, high sensitivity techniques that facilitate cell phenotyping for numerous applications, from healthcare to biofuels. The Buie Lab's second research thrust is the use of electrokinetics to manufacture thin film surface coatings. Their research uses electrokinetics as a bridge between the nanoscale and the macroscale. This is achieved by employing a process known as electrophoretic deposition where the native surface charge on a colloidal particle is exploited to deposit the particle on a surface. The key advantage of this technique is that the use of electric fields allows manipulation of nanoscale particles in a process that readily scales to industrial relevance. To date this process has been exploited to fabricate both superhydrophobic and superhydrophilic surfaces.

AWARDS/ HONORS //

- Faculty Early Career Development (CAREER) Program award, National Science Foundation (2012)
- Minority Faculty Development Workshop Best Poster Award, National Science Foundation (2010)
- University of California President's Postdoctoral Fellowship (2008)
- Dissertation fellowship, Ford Foundation (2007)
- Energy fellowship, Link Foundation (2006)

POSITION PROFILE //

- 2008 -2009: Postdoctoral scholar, Department of Mechanical Engineering, University of California, Berkeley
- 2010 - present: Assistant Professor, Department of Mechanical Engineering, Massachusetts Institute of Technology

