

Andy Schultz

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Research Interests

My research interests lie in the processing, properties, and characterization functional oxides with a focus on clean energy applications. Specifically, my research has focused on the photochemical activity of oxide heterostructures incorporating charged interfaces and surfaces. My research skills and background are applicable to a wide variety of ceramic energy research, including battery, fuel cell, and solar research.

I strongly believe in the necessity of promoting scientific literacy. I consistently work to determine better methods to convey highly technical information to laymen audiences. I am also interested in the policy implications affecting and raised by the development of new materials technologies.

Education

August 2012 (Expected)	Doctor of Philosophy in <i>Materials Science and Engineering</i> Carnegie Mellon University, Pittsburgh
May 2010	Master of Science in <i>Materials Science and Engineering</i> Carnegie Mellon University, Pittsburgh
May 2008	Bachelor of Arts in <i>Chemistry</i> Minor in <i>Physics</i> New York University, New York

Research Experience

2008 – Present

Research Assistant at Carnegie Mellon University
Materials Science and Engineering

Developing routes for improvement in the efficiency of semiconductor water photolysis by exploring the effect of polar interfaces in oxide heterostructures. The introduction of ferroelectric materials, polar surface terminations, or p-n junctions into an oxide heterostructure changes the photochemical activity of oxide films. My research represents further understanding of the effect of polar surface terminations and the activity of supported films. It also represents the drive towards the inclusion of visible light active materials in heterostructured photolysis catalysts.

Publications

Andrew M. Schultz, Paul A. Salvador, and Gregory S. Rohrer. "Enhanced photochemical activity of Fe_2O_3 films supported on SrTiO_3 substrates under visible light illumination." *Chemical Communications*, 2012, 48, 2012-2014.

Andrew M. Schultz, Yiling Zhang, Paul A. Salvador, and Gregory S. Rohrer. "Effect of Crystal and Domain Orientation on the Visible-Light Photochemical Reduction of Ag on BiFeO_3 ." *Applied Materials and Interfaces*, 2011, 3, (5), 1562-1567.

Yiling Zhang, Andrew M. Schultz, Paul A. Salvador, and Gregory S. Rohrer. "Spatially selective visible-light photocatalytic activity of $\text{TiO}_2/\text{BiFeO}_3$ heterostructures." *Journal of Materials Chemistry*, 2011, 21, 4168-4174.

Research Posters

Andrew M. Schultz, Yiling Zhang, Paul A. Salvador, and Gregory S. Rohrer. "Photochemical behavior of BiFeO_3 and heterostructures." *3rd International Congress on Ceramics*. November 2010. Osaka, Japan.

Andrew M. Schultz, Yiling Zhang, Paul A. Salvador, and Gregory S. Rohrer. "Spatial selectivity of photochemical oxidation and reduction on ferroelectric BiFeO_3 Surfaces." *ASM International Pittsburgh Golden Triangle Chapter Young Member's Night*. February 2010. Pittsburgh, PA.

Andrew M. Schultz, Paul A. Salvador, and Gregory S. Rohrer. "Photochemical behavior of $\text{TiO}_2/\text{BiFeO}_3$ heterostructures." *Gordon Research Conference on Fundamental Energy Applications in Solid State Ceramics*. August 2010. New London, NH.

Teaching Experience

Teaching Assistant	Laboratory teaching assistant for the courses <i>Characterization of Materials</i> , <i>Defects in Materials</i> , and <i>Engineering the Materials of the Future</i> .
Research Advisor	Supervised multiple students in undergraduate research projects. Research titles include <i>Photochemical decomposition of stearic acid on BaTiO_3 surfaces</i> , <i>Anisotropic photochemical oxidation on TiO_2</i> , and <i>Locating the electron band edge in Fe_2O_3 for use in PEC Devices</i> .
Private Tutoring	Provided private tutoring services for the courses <i>Phase Transformations and Diagrams</i> and <i>Transport in Materials</i> .

Organizations & Leadership

CMU Graduate Student Assembly
Vice President of Campus Affairs

Elected for two terms (2011-2012) as VP of Campus Affairs of Carnegie Mellon's graduate student government. Focused on communication with the graduate student body, internal representative development, and increasing compliance with student government bylaws. Proposed and organized the creation of a new Vice President of Communications position to address an identified weak point in the organization. Represented the graduate student voice in variety of campus committees, including the University Education Council, the Joint Funding Committee, and the Campus Design Review Committee.

President's Student Advisory Council
Member

Served as a member of a group of students who met monthly to discuss relevant campus issues with the university president.

CMU Faculty Senate
Ex Officio Member

Represented the Graduate Student Assembly as a voting *ex officio* member of Carnegie Mellon's Faculty Senate.

MSE Graduate Student Advisory Committee
Member

Represented the interests of graduate students with the MSE department. Specifically, worked with the department faculty to bring increased clarity to documentation regarding qualifying exams.

Research Skills

Synthesis Pulsed laser film deposition, solid state oxide ceramic synthesis, sol-gel ceramic synthesis

Characterization Atomic force microscopy, scanning electron microscopy, electron backscatter diffraction and orientation mapping, X-ray diffraction, electrochemical testing

Other Skills

Computer html, CSS, Mathematica, Access, SolidWorks, UNIX, \LaTeX , Adobe Illustrator, iWork, Office, Adobe Lightroom, Adobe Photoshop

Languages English (Native Speaker), French (Basic)

Awards

- 2012 Best Presentation, CMU Materials Science and Engineering Graduate Student Symposium
- 2012 Alessandro and Piermaria Reggiori Fellowship in Materials Science and Engineering
- 2011 CMU Materials Science and Engineering Graduate Student Symposium Poster Competition, 2nd Place
- 2010 NSF Travel Fellowship to the 3rd International Congress on Ceramics, Osaka, Japan
- 2010 ASM International Golden Triangle Pittsburgh Chapter Young Members' Night Poster Competition, 4th Place, Graduate Division
- 2008-2012 CMU Materials Science and Engineering Doctoral Fellowship
- 2004-2008 NYU College of Arts and Science Trustees Scholarship

Work Experience

August 2006 – May 2008

Student Worker at New York University, New York, NY
Faculty of Arts and Science Dean's Office

Participated from planning stages through to launch of NYU Arts and Science's audio distribution project, developed make audio recordings of departmental guest lectures and events available digitally to the NYU community. Was deeply involved in developing and executing workflow for planning, recording, and editing lectures.

December 2005 – January 2006

Intern at Metavante, Brown Deer, WI
Information Security

Worked to revise, create, and organize content for Information Security guidelines document to be distributed companywide. Interacted with multiple teams within Information Security to obtain and revise policy information.

Summer 2004, Summer 2005

Summer Intern at Metavante, Brown Deer, WI
Incident Management

Responsible for preparing, attending, and running daily operation status meetings attended by upper- and executive-level management. Digitized and archived 3 years of meeting records. Obtained certification in Information Technology Infrastructure Library (itil) best practices for IT management.

References

Available upon request