

Andy Schultz

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Research Interests

Interested in the processing, properties, and characterization functional oxides with a focus on clean energy applications. Specifically, my current 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. Also interested in the policy implications affecting and raised by the development of new materials technologies.

Education

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| 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

Sarthak Havelia, Shanling Wang, Andrew M. Schultz, K. R. Balasubramaniam, G. S. Rohrer, P. A. Salvador. "Orientation spread epitaxial stabilization of $RE_2Ti_2O_7$ layered compounds: a high-throughput methodology to grow complex metastable crystals." (*Manuscript in Preparation*)

Li Li, Yiling Zhang, Andrew M. Schultz, Paul A. Salvador, and Gregory S. Rohrer. "Visible light photochemical activity of heterostructured $PbTiO_3/TiO_2$ core-shell particles." (*Manuscript in Preparation*)

Andrew M. Schultz, P. A. Salvador, and G. 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 $TiO_2/BiFeO_3$ 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 $TiO_2/BiFeO_3$ 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 BaTiO₃ surfaces</i> , <i>Anisotropic photochemical oxidation on TiO₂</i> , and <i>Locating the electron band edge in Fe₂O₃ 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 need in the organization. Created a new handbook for incoming representatives to improve representative knowledge of the GSA and CMU. Represented the graduate student voice in variety of high level campus committees.

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 and other high level members of the administration.

CMU Faculty Senate
Ex Officio Member

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

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

Awards

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.

Summer 2004, Summer 2005,
December 2005 – January 2006
Intern at Metavante, Brown Deer, WI
Information Security, Incident Management

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. 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.

Other Skills

Computer	html, css, Mathematica, Access, SolidWorks, unix, L ^A T _E X, Adobe Illustrator, iWork, Office, Adobe Lightroom, Adobe Photoshop
Languages	English (Native Speaker), French (Basic)

References

Available upon request