

Name: Natalie Becerra+Stasiewicz

Research fields of interest and experience:

- Renewable energy projects such as fuel cells, lithium-ion batteries and photovoltaic materials.
- High-throughput sample production via deposition sputtering methods.
- General materials characterization via X-ray scattering methods, electron microscopy and surface analysis.

My research experience has mostly been focused on characterization of materials for fuel cells, batteries, and photovoltaic cells. My first such project was to develop methods with Dr. Bruce van Dover to design and build devices to measure the ionic conductivity of electrolyte materials. I improved conductivity measurements by composing and patterning interdigitated electrodes. The focus of the project was to eventually search for materials that could lower the operating temperature of solid oxide fuel cells. I wrote a Python program to analyze ionic conductivity models. In a different project, I assembled prototype lithium ion batteries using silica nanoparticle electrolyte. I also characterized efficiency of electrolyte material via cyclic voltammetry, impedance spectroscopy and charge capacity measurements. For yet another project, I characterized photovoltaic materials. I managed training and maintenance of an X-ray Diffraction system. I completed a certification XRD 2D-detector training by Bruker. I also wrote a program to allow SEM software to locate over one dozen pre-determined positions on a round wafer. I performed X-ray Photoelectron Spectroscopy measurements, utilizing ion gun sputtering system and script writing. I created a database of Materials Characterization Standards (MatChS) with 15 elements, including almost 90 curves for solar cells research and applications: <http://www.solarfuelshub.org/research/matchxps-database.html>

Instrumentation/core of responsibility within the MRL:

- X-ray analysis (powder diffraction, fluorescence)
- Inverted materials microscope

Other instruments qualified to operate:

-Scanning electron microscopy/energy dispersive spectroscopy, x-ray photoelectron spectroscopy, sputter systems, photolithography instruments (like mask aligners and electron beam deposition)

Education:

California Institute of Technology, Pasadena, California	Mechanical Engineering B.Sc. (2008)
Cornell University, Ithaca, New York	Materials Science & Eng. M.Sc. (2012)

Appointments (Professional experience):

2015 - present	Research Engineer, Central Research Facilities, Frederick Seitz Materials Research Laboratory, University of Illinois, Urbana, IL
2013 - 2015	Materials Characterization Engineer, Joint Center for Artificial Photosynthesis, California Institute of Technology, Pasadena, CA
2012 – 2013	Visiting Scientist, Giannelis Research Group, Cornell University, Ithaca, NY
2009 – 2012	Graduate Student, Van Dover Group, Cornell University, Ithaca, NY
2009	Technology Intern, Aerovironment, Monrovia, CA
2008	Teaching Assistant, California Institute of Technology, Pasadena, CA

Awards (if applicable):

2011 MRS Poster Award Nominee
2008 Frank Teruggi Memorial Award: Honors students for activities related to Latin America and improving living conditions for the less fortunate
2004-2008 Caltech Presidential Scholarship: Full tuition scholarship

Selected publications (if applicable):

1. Zhou, L., Q. Yan, J. Yu, R. J. Jones, N. Becerra-Stasiewicz, S. K. Suram, A. Shinde, D. Guevarra, J. B. Neaton, K. A. Persson and J. M. Gregoire (2016). "Stability and self-passivation of copper vanadate photoanodes under chemical, electrochemical, and photoelectrochemical operation." *Phys Chem Chem Phys* 18(14): 9349-9352.

2. Zhou, L., Q. Yan, A. Shinde, D. Guevarra, P. F. Newhouse, N. Becerra-Stasiewicz, S. M. Chatman, J. A. Haber, J. B. Neaton and J. M. Gregoire (2015). "High Throughput Discovery of Solar Fuels Photoanodes in the CuO-V₂O₅ System." *Advanced Energy Materials* 5(22): n/a-n/a.
3. Zhou, L., S. K. Suram, N. Becerra-Stasiewicz, S. Mitrovic, K. Kan, R. J. R. Jones and J. M. Gregoire (2015). "Combining reactive sputtering and rapid thermal processing for synthesis and discovery of metal oxynitrides." *Journal of Materials Research* 30(19): 2928-2933.
4. Suram, S. K., L. Zhou, N. Becerra-Stasiewicz, K. Kan, R. J. Jones, B. M. Kendrick and J. M. Gregoire (2015). "Combinatorial thin film composition mapping using three dimensional deposition profiles." *Rev Sci Instrum* 86(3): 033904.
5. Shinde, A., R. J. R. Jones, D. Guevarra, S. Mitrovic, N. Becerra-Stasiewicz, J. A. Haber, J. Jin and J. M. Gregoire (2015). "High-Throughput Screening for Acid-Stable Oxygen Evolution Electrocatalysts in the (Mn-Co-Ta-Sb)O_x Composition Space." *Electrocatalysis* 6(2): 229-236.
6. Duan, H., C. C. Yuan, N. Becerra, L. J. Small, A. Chang, J. M. Gregoire and R. B. van Dover (2013). "Highthroughput measurement of ionic conductivity in composition-spread thin films." *ACS Comb Sci* 15(6): 273-277.
7. Becerra, N. (2012). "A combinatorial study of Ytria stabilized Zirconia as an electrolyte candidate for intermediate temperature solid oxide fuel cells." Masters Thesis from Cornell University.
8. Becerra, N. (2006). "Booming Sand Dunes." *Caltech Undergraduate Research Journal* 6(1): 18-23.