

BETHANY M. HUDAK

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EDUCATION

- July 2016 | **Doctor of Philosophy, University of Kentucky,** Lexington, KY
Dissertation title: “**Applying Conventional and *In Situ* Transmission Electron Microscopy Techniques to Understand Nanoscale Crystallography**”
Major: **Chemistry**
- May 2010 | **Bachelor of Science, Emory & Henry College,** Emory, VA
Major: **Chemistry**
Minor: **Business Management**
Honors: **Cum Laude**

RESEARCH EXPERIENCE

- July 2016- Present | **Post-Doctoral Researcher, Oak Ridge National Laboratory,** Oak Ridge, TN
Mentor: **Dr. Andrew R. Lupini**
- Using aberration-corrected scanning transmission electron microscope (STEM) to study single-atom dopants in silicon
- Jan 2016- May 2016 | **Advanced Short Term Research Opportunity, Oak Ridge National Laboratory**
Oak Ridge, TN
Mentor: **Dr. Karren L. More**
- Investigating phase transformation of HfO₂ nanorods using *in situ* heating in a transmission electron microscope
- Jan 2011- July 2016 | **Doctoral Research, University of Kentucky,** Lexington, KY
Mentor: **Dr. Beth S. Guiton**
- Studying crystallographic effects of heating on multiple unique nanoscale systems using conventional and *in situ* S/TEM

- 2008-2009 | **Undergraduate Senior Research Project, Emory & Henry College**, Emory, VA
Mentor: **Dr. Laura Hainsworth**
- Conducting research on ethylene production in American Chestnut bark and twig samples using gas chromatography to capture wound-response ethylene readings

TEACHING EXPERIENCE

- Spring 2011 | **Physical Chemistry Teaching Assistant, University of Kentucky**, Lexington, KY
& 2012 | Supervisor: **Dr. Yuguang Cai**
- Fall 2011 | **Analytical Chemistry Teaching Assistant, University of Kentucky**, Lexington, KY
Supervisor: **Dr. Jason DeRouchey**
- Fall 2010 | **General Chemistry Teaching Assistant, University of Kentucky**, Lexington, KY
Supervisor: **Dr. Allison Soult**

PUBLICATIONS

- [9] L. Yu, R. Han, X. Sang, J. Liu, M. P. Thomas, **B. M. Hudak**, A. Patel, K. Page, and B. S. Guiton; Shell-induced Ostwald ripening: Simultaneous structure, composition, and morphology transformations during the creation of hollow iron oxide nanocapsules. *ACS Nano*. **12**, 9051-9059, (2018).
- [8] **B. M. Hudak**, J. Song, H. Sims, M. C. Troparevsky, S. T. Pantelides, P. C. Snijders, and A. R. Lupini; Directed atom-by-atom assembly of dopants in silicon. *ACS Nano*. **12**, 5873-5879, (2018).
- [7] S. Jesse, **B. M. Hudak***, E. Zarkadoula, J. Song, A. Maksov, M. Fuentes-Cabrera, P. Ganesh, I. Kravchenko, P. C. Snijders, A. R. Lupini, A. Borisevich, and S. V. Kalinin; Direct atomic fabrication and dopant positioning in Si using electron beams with active real time image-based feedback. *Nanotechnology*. **29**, 255303, (2018). *equal contribution
- [6] J. Song, **B. M. Hudak**, H. Sims, Y. Sharma, T. Z. Ward, S. T. Pantelides, A. R. Lupini, and P. C. Snijders; Homo-endotaxial one-dimensional Si nanostructures. *Nanoscale*. **10**, 260-267, (2017).
- [5] **B. M. Hudak**, S. W. Depner, G. R. Waetzig, A. Talapatra, R. Arroyave, S. Banerjee, and B. S. Guiton; Real-time atomistic observation of structural phase transformations in individual hafnia nanorods. *Nature Communications*. **8**, 15316, (2017).
- [4] L. Yu, Y. Zhang, **B. M. Hudak**, D. K. Wallace, D. Y. Kim, and B. S. Guiton; Simple synthetic route to manganese-containing nanowires with the spinel crystal structure. *Journal of Solid State Chemistry*. **240**, 23-29, (2016).

- [3] J. Mackey, F. Dynys, **B. M. Hudak**, B. S. Guiton, and A. Sehirlioglu; $\text{Co}_x\text{Ni}_{4-x}\text{Sb}_{12-y}\text{Sn}_y$ Skutterudites: processing and thermoelectric properties.** *Journal of Materials Science*. **51**, 6117-6132, (2016). **STEM data featured on cover.
- [2] G. Li, L. Yu, **B. M. Hudak**, Y.-J. Chang, H. Baek, A. Shundararajan, D. R. Strachan, G.-C. Yi, and B. S. Guiton; Direct observation of Li diffusion in Li-doped ZnO nanowires. *Material Research Express*. **3**, 054001, (2016).
- [1] **B. M. Hudak**, Y.-J. Chang, L. Yu, G. Li, D. N. Edwards, and B. S. Guiton; Real-time observation of the solid-liquid-vapor dissolution of individual Tin(IV) Oxide nanowires. *ACS Nano*. **8**, 5441-5448, (2014).

PRESENTATIONS

Invited presentations:

- [3] **Materials Research Society Meeting, Phoenix, AZ, USA** **2018**
Directed Positioning and Imaging of Single-Atom Dopants for Quantum Computing
- [2] **Microscopy & Microanalysis Meeting, Vendor Tutorial, St. Louis, MO, USA** **2017**
Dynamic Nanostructure Phase Transformations Studied Using Aduro Heating Stage in Nion UltraSTEM
- [1] **CNMS User Week, Oak Ridge, TN, USA** **2014**
Direct Observation of the Vapor-Liquid-Solid Mechanism in Reverse

Contributed presentations:

- [7] **American Physical Society Meeting, Los Angeles, CA, USA** **2018**
Directed Positioning of Subsurface Single-Atom Dopants in Silicon for Quantum Computing
- [6] **Oak Ridge Postgraduate Research Symposium, Oak Ridge, TN, USA** **2017**
Direct Atom-by-Atom Assembly of Dopants in Silicon
- [5] **Microscopy & Microanalysis Meeting, St. Louis, MO, USA** **2017**
Movement and Imaging of Single-Atom Dopants in Silicon
- [4] **American Vacuum Society Meeting, Nashville, TN, USA** **2016**
Direct Observation of the Growth and Dissolution Process of SnO_2 Nanowires
- [3] **CNMS User Week, Oak Ridge, TN, USA** **2015**
Direct Observation of Structural Phase Transformations in Individual Hafnia Nanorods
- [2] **Microscopy & Microanalysis Meeting, Portland, OR, USA** **2015**
Understanding Nanomaterial Synthesis with In situ Transmission Electron Microscopy

- [1] **Materials Research Society Meeting, Boston, MA, USA** **2013**
Direct Observation of the Vapor-Liquid-Solid Mechanism in Reverse

Poster presentations:

- [10] **Microscopy & Microanalysis Meeting, Baltimore, MD USA** **2018**
Towards Atomic-Scale Fabrication in Silicon
- [9] **Microscopy & Microanalysis Meeting, St. Louis, MO USA** **2017**
Direct Observation of Hafnia Structural Phase Transformation
- [8] **Enhanced Data Generated by Electrons Meeting, Okinawa, Japan** **2017**
EELS analysis of bonding in quantum computing materials
- [7] **Materials Research Society Meeting, Boston, MA USA** **2015**
Direct Observation of Structural Phase Transformations in Individual Hafnia Nanorods
- [6] **CNMS User Week, Oak Ridge, TN USA** **2015**
Direct Observation of Structural Phase Transformations in Individual Hafnia Nanorods
- [5] **University of Kentucky Postdoctoral Symposium, Lexington, KY USA** **2015**
Direct Observation of Structural Phase Transformations in Individual Hafnia Nanorods
- [4] **North American Solid State Chemistry Conference, Tallahassee, FL USA** **2015**
Direct Observation of Structural Phase Transformations in Individual Hafnia Nanorods
- [3] **Appalachian Regional Microscopy Society Meeting, Oak Ridge, TN USA** **2014**
Real-time Observation of the Solid-Liquid-Vapor Dissolution of SnO₂ Nanowires
- [2] **ORNL Committee for Women Annual Poster Event 2014, Oak Ridge National Laboratory, Oak Ridge, TN USA** **2014**
Real-time Observation of the Solid-Liquid-Vapor Dissolution of SnO₂ Nanowires
- [1] **Solid State Chemistry Gordon Research Conference, New London, NH USA** **2014**
Real-time Observation of the Solid-Liquid-Vapor Dissolution of SnO₂ Nanowires

FELLOWSHIPS/AWARDS

2018	R&D 100 Finalist – The Atomic Forge	Oak Ridge National Laboratory
2017	Significant Event Award	Oak Ridge National Laboratory
2017	Supplemental Performance Award	Oak Ridge National Laboratory
2016	Advanced Short-Term Research Opportunity (ASTRO)	Oak Ridge National Laboratory

2015	UK-SOPS Postdoctoral Symposium Poster Competition Second Prize	University of Kentucky
2013	NASA KY Graduate Fellowship	University of Kentucky
2013	Center for Advances Materials Research Assistantship	University of Kentucky
2012	KY NSF EPSCoR Research Scholars Program	University of Kentucky
2010	Kentucky Excellence Fellowship	University of Kentucky
2010	Littleton Chemistry Award	Emory & Henry College

SYNERGISTIC ACTIVITIES

Volunteer & Outreach, Activities include work with the Tennessee Science Bowl, participation in the ORNL Physical Sciences Directorate Science Fair trailer, Young-Williams Animal Center in Knoxville, TN, and Rhythm N' Blooms Music Festival in Knoxville, TN.

Workshop, One of 66 participants selected from the United States and Canada to participate in the two-week National School on Neutron and X-Ray Scattering (NXS) hosted by Argonne National Laboratory and Oak Ridge National Laboratory, funded by Department of Energy and National Science Foundation Experimental Program to Stimulate Competitive Research (EPSCoR), August 2013.

REFERENCES

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Dr. Matthew Chisholm
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