Emily Asenath-Smith, Ph.D.

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EDUCATION

PhD Materials Science & Engineering, 2015. *Cornell University*, Ithaca, New York.

MS Ceramic Engineering, 2010. *Alfred University*, Alfred, New York.

AB Chemistry, 2008. *Mount Holyoke Co*llege, South Hadley, Massachusetts.

PROFESSIONAL EXPERIENCE & EMPLOYMENT

2019 – present **Adjunct Assistant Professor of Engineering**
Thayer School of Engineering, Dartmouth College
Hanover, NH 03755

2016 – present **The MAD Pottress**
Sole proprietor; potter and instructor
Norwich, VT 05055

2015 – present **Research Materials Engineer**
Lead investigator for Advanced Materials Team*
Program lead for Ice Adhesion Facility*
ERDC-CRREL, Hanover, NH

2014 – 2015 **Teaching Assistant**
Department of Materials Science & Engineering, Cornell University, Ithaca, NY
Supervisor: Prof. Lara A. Estroff
Courses: Materials Chemistry; Biomineralization

2010 – 2014 **Graduate Research Fellow**
Department of Materials Science & Engineering, Cornell University, Ithaca, NY
Advisor: Prof. Lara A. Estroff

2012, 2013 **Visiting Researcher**
Department of Chemistry, Leeds University, Leeds, UK
Advisor: Prof. Fiona C. Meldrum

2008 – 2010 **Graduate Research Fellow**
Department of Ceramic Engineering, Alfred University, Alfred, NY
Advisor: Prof. Doreen D. Edwards

2006 – 2008 **Research Fellow**
Department of Chemistry, Mount Holyoke College, S Hadley, MA
Advisor: Prof. Wei Chen

TEACHING AND MENTORING EXPERIENCE

2020 – present	***Mentor*** *ACerS Mentor Program*	Mentor to student(s) in the President's Council of Student Advisors of the American Ceramic society.
2016 – present	***Instructor*** *Studio of The MAD Pottress*	Design and instruct individual and small group pottery classes covering all aspects of handbuilding, wheelthrowing, finishing, and glazing. Topics include: beginner and intermediate wheelthrowing; multi-week workshops; clay & cocktails for adults.
2015 – present	***Team Lead*** *Advanced Materials Team ERDC-CRREL*	Built a new program at CRREL from 2015-present to build capacity and execute laboratory-based research on cold regions materials science. In this role, I typically lead 2-4 students and 4-6 full time research staff using a highly collaborative and interdisciplinary approach.
2015	***Trainee*** *Cornell University*	Certificate program on "Building Mentoring Skills," offered by *Center for Integration of Research, Teaching, Learning*.
2011 – 2015	***Project Supervisor*** *Cornell University*	Mentor to undergraduate students from Depts. of Materials Science & Engineering and Chemistry in senior thesis research, writing, and presentation.
2012 – 2014	***Trainee*** *Cornell University*	Participated in teacher training series, leading to completion of a certificate program through the *Cornell Center for Teaching Excellence*.
2013	***Teaching Assistant*** *Cornell University*	Assistant to Materials Chemistry (MSE 3010) junior-level core course: Authored and provided student support on weekly problem sets; graded exams; lectured as needed.
2008	***Teaching Assistant*** *Mt Holyoke College*	Assistant to general chemistry laboratory experiments and grading of weekly reports.
2001	***Instructor*** *Earthworks Pottery School*	Instructed wheel-thrown pottery for continuing education class.

PATENTS

Asenath-Smith, E.; Hoch, G.R.; Punt, D.A.; Donnelly, C.; Hodge, J., "Peel Test Apparatus for Adhesion Testing," *Application No.* 17/169,203, **2021**.

Asenath-Smith, E.; Hoch, G.R.; Punt, D.A.; Donnelly, C.; Hodge, J., "Vertical Draw System and Method for Surface Adhesion of Crystalline Materials," *Application No.* 16/802,490, **2020**.

Asenath-Smith, E.; Ambrogi, E. K.; Brame, J. A. "Multi-spectral Photocatalytic Materials for Removal of Small Molecule Contaminants from Water," *Application No.* 15/999,008, **2018.**

HONORS AND AWARDS

Civilian Service Achievement Medal, US Army, ERDC/CRREL	2020
Teaching Assistant Excellence Award, Materials Science & Engineering Cornell University	2014
**IGERT Fellowship in 'Advanced Materials for a Sustainable Future'* National Science Foundation	2011 – 2013
Betty Lou Baily Scholarship, Society of Women Engineers	2011 – 2012
**Graduate Research Fellowship for 'Heat Transport in Thermoelectric Materials Based on Ruddlesden-Popper Superlattice Oxides'* National Science Foundation	2008 – 2011
Rachel E. Brown Fellowship, Alumnae Association of Mount Holyoke College	2008 – 2009
Rachel Brown Award, Chemistry, Mount Holyoke College	2008
Phi Beta Kappa, Mount Holyoke College	2008
Sigma Xi, Mount Holyoke College	2008
E. Young and K. Williamson Chemistry Scholarship, Mount Holyoke College	2007
American Chemical Society Award, Analytical Chemistry	2007
Marian Groth Landreth '46 Scholarship, Academic Merit, Mount Holyoke College	2007
Cochary Gross Scholarship, Academic Merit, Mount Holyoke College	2007
McLean Memorial Scholarship, Academic Merit, Mount Holyoke College	2006
Louisa Stone Stevenson Award, Chemistry, Mount Holyoke College	2005
Phi Theta Kappa	1997

*Indicates Competitive National Award

SELECTED PRESENTATIONS

American Chemical Society Fall National Meeting, **2019**, San Diego, CA. Oral Presentation: "Interaction of Colloidal Particles with Propagating Cracks in Loaded Ice."

International Union of Crystallography, *International Conference on Crystal Growth and Epitaxy (ICCGE-19),* **2019**, Keystone, CO. Oral Presentation: "Adhesive Properties of Bi-Material Interfaces Formed with Freshwater Columnar Ice."

American Chemical Society Fall National Meeting, **2018**, Boston, MA. Oral Presentation: "Leveraging Chemical Actinometry and Optical Radiometry to Reduce Uncertainty in Photochemical Research." Awarded *Certificate of Merit* by Division of Environmental Chemistry.

SELECTED PRESENTATIONS (cont.)

International Congress on Marine Corrosion and Fouling (ICMCF), **2018**, Florida Institute of Technology, Melbourne, FL. Oral Presentation: "Towards a Standardization of Ice Adhesion Testing and Evaluation."

American Chemical Society Fall National Meeting, **2017**, Washington, DC. Oral Presentation: "Multi-spectral Photocatalysis for Improved Degradation of Recalcitrant Contaminants from Aqueous Systems."

Gordon Research Seminar on Crystal Growth & Assembly, **2015**, University of New England, Biddeford, ME. Invited Oral Presentation: "Bio-inspired Crystallization of Oxides in an Inorganic Matrix: Hematite (α-Fe_2O_3) in Silica Hydrogel."

Materials Research Society, MRS Fall Meeting & Exhibit, **2014**, Boston, MA. Oral Presentation: "Effect of a Silica Hydrogel Matrix on the Mosaic Structure and Formation Mechanism of Hematite."

International Union of Crystallography, *International Conference on Crystal Growth and Epitaxy (ICCGE-17),* **2013**, Warsaw, Poland. Oral Presentation: "Inorganic-Inorganic Composite Materials Formed by Crystal Growth in Hydrogels."

JOURNAL PUBLICATIONS

(in reverse chronological order)

1. Thompson Towell, K.L.; Matthews, E.M.; Montmayeur, O.; Burch, W.T.; Elliot, T.J.; Melendy, T.D.; Reilly-Collette, M.I.; Parker, M.W.; Murdza, A.; O'Connor, D.T.; Asenath-Smith, E., "Construction and Structural Analysis of an Arched Cellulose Reinforced Ice Bridge for Transportation Infrastructure in Cold Regions," *Cold Regions Sci. Technol.* **2022**, *in press*.

2. Lever, J.H.; Asenath-Smith, E.; Taylor, S. Lines, A.P., "Assessing the Mechanisms Thought to Govern Ice and Snow Friction and Their Interplay with Substrates Brittle Behavior," *Frontiers in Mech. Eng* **2021**, 7, 57.

3. Lever, J.H.; Lines, A.P.; Taylor, S.; Hoch, G.R.; Asenath-Smith, E.A.; Sodhi, D.S., "Investigation into the Mechanics Underlying Ice-Skate Friction," *J. Glaciology* **2021**, 1-20.

4. Asenath-Smith, E.; Ambrogi, E. K.; Barnes, E.; Brame, J. A., "Colloidal Suspensions of Fe_2O_3 through Synergistic Reactive Oxygen Species Interactions," *Colloids Surf. A* **2020**, 603, 125179.

5. Asenath-Smith, E.; Hoch, G.R; Erb, C.T., "Adhesion of Freshwater Columnar Ice to Material Surfaces by Crystallization from the Melt," *J Crystal Growth* **2020** 535, 12563.

6. O'Connor, D.T.; West, B.; Haehnel, R.B.; Asenath-Smith, E.; Cole, D., "A Viscoelastic Integral Formulation and Numerical Implementation of an Isotropic Constitutive Model of Saline Ice." *Cold Regions Sci.Technol.* **2020**, 171, 102983.

7. Asenath-Smith, E.; Ambrogi, E. K.; Moores, L. C.; Newman, S.; Brame, J. A., "Leveraging Chemical Actinometry and Optical Radiometry to Reduce Uncertainty in Photochemical Research" *J. Photochem. Photobiol. A* **2018**, *372*, 279-287.

8. Breton, D. J.; Lamie, N. J.; Asenath-Smith, E., "Triboelectric Charge Variability in Firearm Particulates and Projectiles," *J. Electrostatics* **2017**, *89*, 13-19.

9. Goldman, A. R.; Asenath-Smith, E.; Estroff, L. A., "Mosaic Anisotropy Model for Magnetic Interactions in Mesotructured Crystals," *APL Materials* **2017**, *5*, 104901.

10. Oleske, K. W.; Barteau, K. P; Beaucage, P. A.; Asenath-Smith, E.; Wiesner, U.; Estroff, L. A., "Nanopatterning of Crystalline Transition Metal Oxides by Surface Templated Nucleation on Block Copolymer Mesostructures," *Cryst. Growth Des.* **2017**, *17*, 5775-5782.

11. Asenath-Smith, E.; Hovden, R.; Uhl, A. M.; DiCorato, A.; Noble, J. M.; Kim, Y. Y.; Kourkoutis, L. F.; Meldrum, F. C.; Estroff, L. A., "Composite Mesoscale Architectures Formed by Bio-inspired Growth in Confinement: Cuprite (Cu_2O) Rods with Incorporated Au Nanoparticle Arrays," *Chem. Mater.* **2017**, *29*, 555-563.

12. DiCorato, A. E.; Asenath-Smith, E.; Kulak, A. N.; Meldrum, F. C.; Estroff, L. A., "Facilitating the interaction Between Copper (I) Oxide and Gold Nanoparticles Through Crystallization in Confinement," *Crystal Growth & Des*. **2016,** *16*, 6804-6811.

13. Zachman, M. J.; Asenath-Smith, E.; Estroff, L. A.; Kourkoutis, L. F., "Site-Specific Preparation of Intact Solid-Liquid Interfaces by Label-Free In Situ Localization and Cryo-FIB Lift-Out," *Microsc. & Microanal.* **2016**, 22, 1338-1349.

14. Asenath-Smith, E.; Estroff, L. A., "The Role of Akaganeite (β-FeOOH) in the Growth of Hematite (α-Fe_2O_3) in an Inorganic Silica Hydrogel," Crystal Growth & Des. **2015***, 15,* 3388-3398.

15. Asenath-Smith, E.; Hovden, R.; Kourkourtis, L. F.; Estroff, L. A., "Hierarchically-Structured Hematite Architectures Achieved by Growth in a Silica Hydrogel," *J. Amer. Chem. Soc.* **2015**,*137*, 5184-5192.

16. Asenath-Smith, E.; Estroff, L. A., "Sectioning of Individual Hematite Pseudocubes with Focused Ion Beam Enables Quantitative Structural Characterization at Nanometer Length Scales," *Microsc. Microanal.* **2014**, *20*, 635-644.

17. Sai, H.; Wee Tan, K.; Hur, K; Asenath-Smith, E.; Hovden, R.; Jiang, Y.; Riccio, M.; Muller, D.; Elser, V.; Estroff, L.A.; Gruner, S. M.; Wiesner, U., "Hierarchical porous polymer scaffolds from block copolymers," *Science* **2013**, *341*, 530-534.

JOURNAL PUBLICATIONS (cont.)

18. Asenath-Smith, E.; Li, H. Y.; Keene, E. C.; I, Z.; and Estroff, L. A., "Crystal Growth in Hydrogels as a Model for Biomineralization," *Adv. Funct. Mater.* **2012**, *22*, 2891-2914.

19. Asenath-Smith, E.; Misture, S. T.; Edwards, D. D., "Structural Behavior and Thermoelectric Properties of the Brownmillerite System $Ca_2(Zn_xFe_{2-x})O_5$," *J. Solid State Chem.* **2011**, *184*, 2167-2177.

20. Asenath-Smith, E.; Lokuhewa, I. N.; Misture, S. T.; Edwards, D. D., "*p*-Type Thermoelectric Properties of the Oxygen-deficient Perovskite $Ca_2Fe_2O_5$ in the Brownmillerite Structure,"*J. Solid State Chem.* **2010**, *183*, 1670-1677.

21. Asenath-Smith, E.; Chen, W., "How to Prevent the Loss of Surface Functionality Derived from Aminosilanes," *Langmuir* **2008**, *21*, 12405-12409.

PUBLICATIONS IN PROFESSIONAL CONFERENCE/SYMPOSIUM PROCEEDINGS

22. Zachman, M. J.; Asenath-Smith, E.; Estroff, L. A.; Kourkoutis, L. F., "Revealing the Internal Structure and Local Chemistry of Nanocrystals Grown in Hydrogel with Cryo-FIB Lift-Out and Cryo-STEM," *Microsc. & Microanal*. **2015**, *21*, 1144, 2291-2292.

TECHNICAL REPORTS

1. Asenath-Smith, E.; Lieblappen, R.; Taylor, S.; Winter, R.R.; Melendy, T.D.; Moser, R.D; Haehnel, R.B., "Observation of Crack Arrest in Ice by High Aspect Ratio Particles During Uniaxial Compression," *ERDC Tech. Report* **2021**, TR-22-3.

2. Lovell, A.R.; Hoch, G.R.; Donnelly, C.J.; Hodge, J.M.; Haehnel, R.B.; Asenath-Smith, E., "Evaluation of Ice Removal from Surfaces in Shear and Tension: The Ice Adhesion Peel Test (IAPT)," *ERDC Tech. Note* **2021**, TN-21-1.

3. Ambrogi, E.K.; Asenath-Smith, E.; Brame, J.A., "High-Performance Photocatalytic Degradation of Model Contaminants with Iron Oxide–Based Colloidal Solutions under Broad-Spectrum Illumination," *ERDC Tech Report* **2020**, TR-20-14.

4. Ambrogi, E.K.; Asenath-Smith, E.; Ballard, W. A.; Moores, L.C.; Brame, J.A., "Cross-Comparison of Advanced Oxidation Processes for Remediation of Organic Pollutants in Water Treatment Systems," *ERDC Tech Report* **2019**, TR-19-3.

5. Asenath-Smith, E.; Melendy, T. D.; Bernier, A. P.; Blaisdell, G. L., "Airfield Damage Repair Materials at Extreme Cold Temperatures," *ERDC Tech. Report* **2019**, TR-19-2.

6. Heller, J.; Asenath-Smith, E., "Surface Wettability using Contact Angle Goniometry," *ERDC Tech. Report* **2018**, TR-18-1.

CONTRIBUTED WORKS, MEDIA FORMAT

1. "Ice Adhesion Basic Research," Power of ERDC Podcast, Episode #5, May 21, **2021**. https://www.dvidshub.net/audio/66446/power-erdc-podcast-ep-5-ice-adhesion-basic-research
2. "GO-GO: Research at a U.S. Federal Laboratory," Guest scientist article for Guest Forum on realPhDeal.com, June 30, **2020**. https://realphdeal.com/emilyasenathsmith/
3. "Ice Adhesion Basic Research," ERDC Corporate Communications, October, 10, **2020**. https://vimeo.com/449407303
4. "Power of ERDC: Materials Research in Cold Regions Science," ERDC Corporate Communications, April 10, **2018**. https://www.dvidshub.net/video/642755/power-erdc-materials-research-cold-region-science

PROFESSIONAL & TECHNICAL SOCIETIES

Materials Research Society	2010
American Chemical Society	2008
American Ceramic Society	2006

PROFESSIONAL DEVELOPMENT

Leadership Development Program, ERDC-CRREL	2017
ACerS President's Council of Student Advisors, Delegate of Cornell University	2014
Colman Leadership Program, Diversity Programs in Engineering, Cornell University	2014
Safety and Reactive Chemicals Workshop, EH&S, Cornell University	2014
International Summer School on Crystal Growth, Gdansk Univ. of Technol., Poland	2013

MEMBERSHIP ON PANELS

- *American Chemical Society*, Division of Environmental Chemistry (ENVR), Founding chair for technical symposium on solutes and impurities in ice, ACS Fall Meeting, San Diego, CA, 2019.
- *Interagency Workgroup on De-Icing*, Air Force Civil Engineer Center, 2019-present
- *ERDC Materials Science Community of Practice*, 2015 – present.
- *American Chemical Society*, Division of Environmental Chemistry (ENVR), Co-Chair for Technical Symposium on Advanced Oxidation, ACS Fall Meeting, Boston, MA, 2018.
- *Water Treatment Interagency Working Group (WaTr)*, Chair for sub-committee on Chemical and Photocatalytic Processes, 2017-2019.
- *President's Council of Student Advisors* to the Board of Directors of the American Ceramic Society, Delegate of Cornell University, 2014.

SERVICE

Global

- Center for Science Teaching & Learning, Rockville Centre, NY. Served as *Clean Tech Competition* Judge, 2014.

Organizational

- *xTechSearch Competition*, US Army. Served as a judge for proposal evaluations. 2018-present.

University

- *Christopher Reed Science Competition*, Department of Chemistry, Dartmouth College, Hanover, NH. Served as judge for poster submissions, 2017-present.
- *Cornell University Student Library Council*, Cornell University, 2011-2012.
- *Expanding Your Horizons*, Cornell University, panelist on STEM education for women, 04/2012.
- *Graduate Women in Science Conference*, panelist for work-life balance session, 06/2011.
- *Peer Review Board*, Alfred University, 2010.

Departmental

- Materials Science and Engineering Department, Cornell University, 2012-2013. Ambassador and mentor for prospective graduate students.

Community Outreach

- *Vermont Autism Task Force*, parent member, 2018-present.
- *Cornell Center for Materials Research (CCMR)*, Cornell University, 2010 – 2015. Periodic participation in outreach events coordinated by CCMR for audiences ranging from home-schooled elementary students to high school chemistry teachers.
- *The Children & Youth Learning Initiative* at Alfred University, 2009. Taught laboratory-based activities for middle school aged children.
- *Earthworks Pottery School*, Board of Directors, 2001.
- *Beech Hill Hospital*, Dover, NH, 1995. Designed and taught a pottery workshop for adolescent patients at a rehabilitation facility.

ACTIVITIES AND INTERESTS

- Utilitarian pottery of the American Craft movement with emphasis on clay and glaze development, wheel thrown and altered forms, and traditional firing techniques.
- Children and youth education including instructional methods for non-traditional learners that include the use of auditory, visual, tactile, and kinesthetic methods.
- Cycling and mountain biking including trail development and mechanical maintenance.
- Organic gardening specializing in heirloom tomato cultivation and seed preservation.