Exponent®
Engineering & Scientific Consulting

Aine Connolly, Ph.D.

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Professional Profile

Dr. Connolly is a materials scientist with expertise in materials characterization and analysis, with a particular focus on thin film materials and their structural evolution during thermal processing. She has extensive background in characterization techniques, including Raman spectroscopy, scanning electron microscopy, energy-dispersive X-ray spectroscopy (EDS), and synchrotron X-ray diffraction (XRD), as well as in experimental design and method development. Her work focuses on the application of these and other tools in order to understand and characterize failures in products and consumer electronics.

Prior to joining Exponent, Dr. Connolly completed her doctoral work at Cornell University, where she studied the evolution of non-equilibrium phases in thin film oxides due to laser annealing. Her work involved the development of laser annealing techniques for materials discovery, including creating a fully novel method for analyzing the structural evolution in situ using synchrotron XRD, and assisting on its implementation for fully autonomous materials discovery of oxide phases. Dr. Connolly also worked with ultra-wide bandgap semiconductors, including gallium oxide, with applications in electronics for extreme environments.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Cornell University, 2023

B.A., Physics, Vassar College, 2017

Publications

Gann K, Chang C, Chang M-C, Sutherland D, Connolly A, Muller D, van Dover RB, Thompson M. Initial nucleation of metastable y-Ga2O3 during sub-millisecond thermal anneals of amorphous Ga2O3. Applied Physics Letters 2022; 121 (6).

Ament S, Amsler M, Sutherland D, Chang M-C, Guevarra D, Connolly A, Gregoire J, Thompson M, Gomes C, van Dover RB. Autonomous materials synthesis via hierarchical active learning of non-equilibrium phase diagrams. Science Advances 2021; 7 (51).

Bell R, Beaucage P, Murphy M, Connolly A, Wiesner U, Ginley D, van Dover RB, Thompson M. Rapid Identification of Synthetic Routes to Functional Metastable Phases Using X-ray Probed Laser Anneal Mapping (XPLAM) Time–Temperature Quench Maps. Chemistry of Materials 2021; 33, 12, 4328–4336.

Sutherland D, Connolly A, Amsler M, Chang M-C, Gann K, Gupta V, Ament S, Guevarra D, Gregoire J, Gomes C, van Dover RB, Thompson M. Optical Identification of Materials Transformations in Oxide Thin Films. ACS Comb. Sci. 2020; 22, 12, 887–894.

Ocola L, Connolly A, Gosztola DJ, Schaller R, Yanguas-Gil A. Infiltrated zinc oxide in poly (methyl methacrylate): An atomic cycle growth study. J. Phys. Chem C. 2017; 121, 3, 1893–1903

Bjornsson, M, Connolly A, Mahat S, Rachmilowitz B, Daly B, Antonelli G; Myers A, Singh K, Yoo H, Wing S. Picosecond ultrasonic study of surface acoustic waves on titanium nitride nanostructures. J. Appl. Phys. 2015; 117, 095305.

Presentations

Connolly A, Gann K, Tetlak S, Protasenko V, Slocum M, Mou S, Thompson M. Non-Destructive Characterization of Annealed Si-Implanted Thin Film β-Ga2O3. Poster presentation, Gallium Oxide Workshop (GOX), Washington, DC 2022.

Connolly A, Chang M-C, Gann K, Sutherland D, van Dover RB, Thompson M. In Situ Time-Resolved Studies of Sub-Millisecond Metastable Phase Formation in Thin-Film Oxide Materials via Optical Imaging and Synchrotron X-Ray Diffraction. Presentation, MRS Spring Meeting, Honolulu, HI, 2022.

Connolly A, Chang M-C, Gann K, Sutherland D, van Dover RB, Thompson M. Tracking In Situ Metastable Phase Formation via Synchrotron X-Ray Diffraction. Presentation, CHESS User Meeting, Ithaca, NY, 2022.

Connolly A, Chang M-C, Gann K, Amsler M, Sutherland D, Thompson M, van Dover RB. Time-Resolved Phase Formation Studies Inform Machine Learning Algorithms During Autonomous Materials Discovery. Presentation, MRS Fall Meeting, Boston, MA, 2021.

Connolly A, Sutherland D, Gann K, Amsler M, van Dover RB, Thompson M. High-Throughput In Situ Tracking of Millisecond-Scale Metastable Phase Formation in Thin-Film Oxides. Presentation, MRS Fall/Spring Meeting, Virtual, 2020.

Connolly A, Sutherland D, Amsler M, Ament S, Thompson M, van Dover RB, Gomes C. Autonomous Experimental Phase Analysis of Oxide Systems Demonstrated via Optical Imaging and Spectroscopy. Poster presentation, MRS Fall Meeting, Boston, MA, 2019.

Connolly A, Bjornsson, M, Mahat S, Rachmilowitz B, Daly B. Picosecond ultrasonic study of surface acoustic waves on titanium nitride nanostructures. Poster presentation, APS March, San Antonio, TX, 2015.