Exponent®
Engineering & Scientific Consulting

Anna Overholts, Ph.D.

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Professional Profile

Dr. Overholts is trained as a polymer chemist, with extensive work in the field of polymer mechanochemistry. Her broad range of experience includes polymer catalysis, reaction kinetics, and development and characterization of stimuli-responsive materials.

As a chemist from an interdisciplinary field, Dr. Overholts is skilled in both small molecule and macromolecular synthesis, including a variety of controlled polymerization methods. She has experience in the characterization of polymeric materials, with expertise in techniques such as NMR, LCMS, gel permeation chromatography (GPC), fluorescence spectroscopy, UV-vis spectroscopy, and differential scanning calorimetry (DSC).

Prior to joining Exponent, Dr. Overholts earned her Ph.D. from Caltech with a research focus on developing new force-responsive small molecules for stress sensing and mechanochemical lithography in polymeric materials. She additionally studied the kinetics of these force-induced reactions. From this work she has practical knowledge of the impact of mechanical force in polymeric materials on the scale of atomic bonds.

Academic Credentials & Professional Honors

Ph.D., Chemistry, California Institute of Technology (Caltech), 2023

A.B., Chemistry, Cornell University, 2018

Barbara J. Burger Graduate Fellowship, 2022

American Chemical Society Undergraduate Award in Organic Chemistry, 2018

Prior Experience

NSF Graduate Research Fellow, Division of Chemistry and Chemical Engineering, Caltech, Oct. 2018 – May 2023

Patents

Robb, M. J.; Overholts, A. C. “Method for multicolor lithography using mechanical force.” U.S. Provisional Patent Application No. 63/325,282. March 30, 2022.

Publications

McFadden, M. E.; Barber, R. W.; Overholts, A. C.; Robb, M. J. “Naphthopyran molecular switches and their emergent mechanochemical reactivity.” Chem. Sci. 2023. In Press.

McFadden, M. E.; Overholts, A. C.; Osler, S. K.; Robb, M. J. “Validation of an accurate and expedient initial rates method for characterizing mechanophore reactivity.” ACS Macro Lett. 2023, 12, 440-445.

Overholts, A. C.; Granados Razo, W.; Robb, M. J. “Mechanically gated formation of donor–acceptor Stenhouse adducts enabling mechanochemical multicolor soft lithography.” Nat. Chem. 2023, 15, 332-338.

Luo, S. M.; Barber, R. W.; Overholts, A. C.; Robb, M. J. “Competitive activation experiments reveal significantly different mechanochemical reactivity of furan–maleimide and anthracene–maleimide mechanophores.” ACS Polym. Au. 2023, 3, 202-208.

Overholts, A. C.; Robb, M. J. “Examining the impact of relative mechanophore activity on the selectivity of ultrasound-induced mechanochemical chain scission.” ACS Macro Lett. 2022, 11, 733-738.

Overholts, A. C.; McFadden, M. E.; Robb, M. J. “Quantifying activation rates of scissile mechanophores and the influence of dispersity.” Macromolecules 2022, 55, 276-283.

Smith, B. J.; Parent, L. R.; Overholts, A. C.; Beaucage, P. A.; Bisbey, R. P.; Chavez, A. D.; Hwang, G.; Park, C; Evans, A. M.; Gianneschi, N. C.; Dichtel, W. R. “Colloidal covalent organic frameworks.” ACS Cent. Sci. 2017, 3, 58-65.

Smith, B. J.; Overholts, A. C.; Hwang, G.; Dichtel, W. R. “Insight into the crystallization of amorphous imine-linked polymer networks to 2D covalent organic frameworks.” Chem. Commun. 2016, 52, 3690-3693.

Presentations

“Multicolor Mechanochemical Lithography in Polymeric Materials.” ACS National Meeting, San Diego, CA, Mar. 20, 2022.