



Exponent®

Engineering & Scientific Consulting

Eli Fastow, Ph.D.

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Professional Profile

Dr. Eli Fastow is a consulting polymer scientist at Exponent specializing in soft materials analysis, with a robust grounding in fundamental polymer physics and extensive experience characterizing structure-property-processing relationships. He has experience investigating novel polyolefin copolymers for high-performance and consumer applications, contributing to the development and commercialization of polymeric coating materials, and resolving challenges related to polymer manufacturing.

Dr. Fastow is an experienced soft matter analytical scientist with expertise in a wide range of characterization techniques. He supports clients with subject matter expertise such as thermal analysis (e.g. DSC and TGA), microscopy (e.g. SEM/EDS, optical, and AFM), scattering (e.g. SAXS, WAXS, and DLS), spectroscopy (e.g. FTIR and UV-Vis), separations (e.g. High-temp GPC, conventional GPC), and a particular expertise in DMA and rheology. He has led analytical method development across a range of material systems and characterization techniques to turn complex problems into actionable insights, accelerating product development and improving material performance.

Dr. Fastow's technical background includes in-depth experience with polyolefin copolymers, latex coatings, and a broad range of characterization techniques. His doctoral research at University of Pennsylvania focused on polymer-to-polymer transformations for plastic upcycling. He worked with an interdisciplinary team on a Department of Energy-funded project to functionalize polyolefins to create high-value copolymers for consumer and industrial applications, including food packaging and cable jacketing. His primary contributions to this project comprised robust analytical science, including scattering, thermal, surface, rheological, and mechanical characterization techniques. Additionally, Dr. Fastow developed extensive experience with polymer processing (including thermoforming and extrusion) and its commensurate impact on polymer structure (crystallinity and phase morphology).

While at The Dow Chemical Company, he supported latex coatings product development, commercialization, sampling, and scale-up throughout the entire product lifecycle as a subject matter expert in rheology, thermal analysis, and microscopy. Dr. Fastow also has experience in polymer sustainability, including the development of bio-based consumer materials, selection of additives with reduced hazard profiles, and development of chemical recycling processes.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, University of Pennsylvania, 2025

M.S., Materials Science and Engineering, University of Pennsylvania, 2022

B.S., Materials Science and Engineering, University of Maryland, 2020

Geoffrey Belton Award, University of Pennsylvania Department of Material Science and Engineering, 2023

Graduate Fellowship, Vagelos Institute for Energy Science and Technology, 2022

Prior Experience

Senior Research Specialist, The Dow Chemical Corporation, Collegeville, 2025-2026

Graduate Research Fellow, University of Pennsylvania, Philadelphia, 2020-2025

Senior Lab Manager, TerrapinWorks University of Maryland, 2017-2020

Research Assistant, Radiation and Polymer Science Lab University of Maryland, 2016-2020

Summer Undergraduate Research Fellow, National Institute of Standards and Technology, 2018-2019

Professional Affiliations

American Physical Society - Member

American Chemical Society - Member

Tau Beta Pi – Member

ASTM International – Member of the E37 committee and E37.01, E37.03, E37.05, E37.08, and E37.10 subcommittee

Publications

Lee M, Liang Y, Cuthbertson AA, Mohamed SY, Puente-Urbina A, Michener WE, Miscall J, Lincoln C, Lahive CW, DesVeaux JS, Fastow EJ, Winey KI, Choi H, Knott BC, Banakis N, Allen RD, Beckham GT, Knauer KM. [Extraction, purification, and reuse of dyes from coloured polyester textiles](#). Nature Sustainability 2025; 1–12.

Fastow EJ, Radzanowski A, Coughlin EB, Winey KI. [Increasing branching and functionalization decreases crystallinity and crystallization rate in linear EVOH](#). ACS Appl. Polym. Mater. 2025.

Radzanowski A, Fastow EJ, Tu CH, Votruba-Drzal J, Nair V, Winey KI, Coughlin EB. [Impact of hydroxyl functionalization and unsaturation on linear poly\(ethylene-co-vinyl alcohol\) analogs](#). Macromolecules 2025.

Ogbu IM*, Fastow EJ*, Winey KI, Kozlowski MC. [Hydroesterification of polycyclooctene to access linear ethylene ethyl acrylate copolymers as a step toward polyolefin functionalization](#). Macromolecules 2024; 57(22):10767–10777. *Co-first authors.

Ogbu IM, Tu CH, Fastow EJ, Hinton ZR, Winey KI, Kozlowski MC. [N₂O deconstruction of polycyclooctene to generate carbonyl-functionalized macromonomers](#). Polymer Degradation and Stability 2024; 110987.

Tu CH, Fastow EJ, Chethalen RJ, Papamokos G, Coughlin EB, Winey KI. [Coupling-decoupling between fast stickers and slow backbones in associating polymers with side-chain terminal-functionalization](#). Macromolecules 2024; 57(16):8067–8081. Issue Cover.

Ogbu IM, Fastow EJ, Zhu W, Wells LA, Chethalen RJ, Nair V, Hinton ZR, Balzer AH, Hu W, Coughlin EB, Winey KI, Kozlowski MC. [Hydrocarboxylation of C=C bonds in polycyclooctene: progress toward valorization of waste polyolefins](#). *Macromolecules* 2024; 57(12):5860–5869.

Fastow EJ*, Chethalen RJ*, Coughlin EB, Winey KI. [Thiol-ene click chemistry incorporates carboxylic acid-terminated alkane pendants on polycyclooctene to tune properties](#). *GIANT* 2024; 17:100231. *Co-first Authors.

Chethalen RJ*, Fastow EJ*, Coughlin EB, Winey KI. [Thiol-Ene click chemistry incorporates hydroxyl functionality on polycyclooctene to tune properties](#). *ACS Macro Lett.* 2023; 107–112. *Co-first Authors.

Oleshko V, Fastow EJ, Scott K, Cumings J. [Experimental evaluation of lithium detection limits by windowless SDD EDXS and EELS in a binary Al-Li alloy powder](#). *Microscopy and Microanalysis* 2020; 26 (S2):986–987.

Fastow EJ, Cook S, Dean P, Ott P, Wilson J, Yoon H, Dietz T, Bateman F, Al-Sheikhly M. [Single-step synthesis of atmospheric CO₂ sorbents through radiation-induced graft polymerization on commercial-grade fabrics](#). *Radiation Research* 2019; 192(2):219–230.

Presentations

Fastow EJ, Chethalen RJ, Ogbu IM, Coughlin EB, Kozlowski MC, Winey KI. Polymer upcycling: adding ethyl acetate or carboxylic acid groups to polyolefins. Oral Presentation, SPE International Polyolefin Conference, SPE, Galveston, TX, 2025.

Fastow EJ, Chethalen RJ, Radzanowski A, Coughlin EB, Winey KI. Chain and pendant architectures tune structure and properties in OH-functionalized polyolefins. Oral Presentation, SPE International Polyolefin Conference, SPE, Galveston, TX, 2024.

Fastow EJ, Chethalen RJ, Coughlin EB, Winey KI. Thiol-Ene click chemistry functionalization of C=C bonds in partially-unsaturated polyolefins: a route to highly tunable associating polymers. Poster Presentation, GRC on Polymer recycling and Upcycling, GRC, New Haven, CT, 2023.

Fastow E, Zhu W, Wells L, Kozlowski M, Winey K. Functionalization of C=C bonds in polycyclooctene: progress in a two-step approach to polyolefin valorization. Poster Presentation, In Bulletin of the American Physical Society, American Physical Society, Chicago, IL, 2022.

Project Experience

Polyolefin Conversions for Upcycling

Developed an analytical program (including a range of new methods) and applied standard characterization methods to identify the processing-structure-property relationships that dictate the performance of novel co-polymers. The data from these studies contributed to the field of polyolefin upcycling and has been published in leading peer-reviewed journals.

Next Generation Commercial Coatings

Led rheology and microscopy method development to support the development of next generation coatings materials at Dow. These analytical methods accelerated product development for architectural and industrial coatings through exploratory research and new material scale-up.

Manufacturing Reliability

Identified critical polymer and complex fluid processing-properties relationships to resolve manufacturing challenges in cutting edge material synthesis and processing. This analytical work accelerated the scale-up of new products and resolved persistent challenges with manufacturing of commercial materials.

Additional Education & Training

Polymer Upcycling Short Course, American Physical Society, 2022