

Exponent®
Engineering & Scientific Consulting

Hilda Buss, Ph.D., P.E.

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Professional Profile

With over a decade of experience in the polymer science field, Dr. Buss' interests include using material structure-property relationships to address real-world problems. As a Managing Engineer at Exponent, Dr. Buss works in product development, scale up, and failure analysis of polymer systems with a specialization in performance and sustainability. Dr. Buss has assisted clients in all stages of the product life cycle from product design to in-field performance and failure analysis, including litigation support. She has applied this expertise to a variety of applications including coatings, piping, consumer devices, food packaging, and personal care products, among others. Dr. Buss is well versed in numerous polymerization methods (including free radical, controlled free radical, emulsion, anionic, and solid phase synthesis) and characterization techniques (including DSC, GPC, NMR, FTIR LC-MS, and TGA). She routinely utilizes these methods and techniques to assist in the formulation of novel materials for commercial products such as paints, creams, artificial stucco, and detergents.

With an interest in designing for sustainability, including the recycling of plastic materials, as well as evaluating the release of microplastics from products, Dr. Buss is serving on the National Academy of Sciences (NASEM) Roundtable on Plastics and is a member of the Society for Plastics Engineers (SPE), where she has presented on designing for recyclability. She is a voting member of the ASTM Committee on Plastics (D20), and a member of the subcommittee on Recycled Plastics (D20.95), as well as part of the ASTM E60.42 Working Group WK#88282 – "Designing for Recyclability of Single-Use Products and Packaging used in Healthcare Applications" and the ASTM #AC841 Multi-Committee Task Group on Microparticles (Microplastics). Dr. Buss is formally trained as a chemical engineer and is a licensed engineer in the state of California. Dr. Buss' doctoral research at UC Berkeley was focused on marine antifouling coatings and high transference number electrolytes for batteries, while her undergraduate research work involved designing polymer systems for drug delivery. Prior to joining Exponent, Dr. Buss worked at Dow Chemical, developing new monomers for use in acrylic emulsion polymerization and developing methods for evaluating primary cleaning in the auto-dishwashing market.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, University of California, Berkeley, 2017

B.S., Chemical Engineering, Massachusetts Institute of Technology (MIT), 2011

National Science Foundation Graduate Research Fellow, 2012-2015

Licenses and Certifications

Professional Engineer, Colorado, #PE.0068806

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Prior Experience

Senior Engineer, Dow Chemical, 2017-2020

Professional Affiliations

Society of Plastics Engineers (SPE) member (2020-present)

Participating Member of ASTM International (2022-present)

Languages

Czech

Patents

US Patent 12264213B2: "Preparation of an aqueous dispersion of acrylate-siloxane copolymer particles", granted April 2025.

International patent application WO 2020/123198 A1: “Personal Care Formulation Comprising a Multistage Polymer with a Carbosiloxane”, June 2020

International patent application WO 2020/123197 A1: “Polymer Blend for Personal Care Formulation”, June 2020

International patent application WO 2020/123196 A1: “Multistage Polymer”, Buss H. et al. June 2020

US patent US20210401725A1: “Polymer Blend”, granted Oct 2024.

European patent EP4021911A1: “Preparation of an aqueous dispersion of acrylate-siloxane copolymer particles”, granted September 2023.

European patent EP3893836A1: “Personal care formulation comprising a multistage polymer with a carbosiloxane”, granted December 2022.

Canada patent CA3165682A1: “Aqueous dispersion of acrylate-siloxane copolymer particles”, granted May 2024.

European patent EP4103569B1: “Preparation of aqueous dispersion of acrylate-siloxane copolymer particles”, granted January 2024.

Publications

Buss, H., "Master Stakeholder Management." C&EN, May 26 2019.

Abbott, L.; Buss, H.; Thelen, J.; McCloskey, B.; Lawson, J. "Polyanion Electrolytes with Well Ordered Ionic Layers in Simulations and Experiment." Macromolecules (2019), 52 (15), 5518-5528.

Buss, H. G.; Chan, S. Y.; Lynd, N. A.; Mccloskey, B. D. Nonaqueous Polyelectrolyte Solutions as Liquid Electrolytes with High Lithium Ion Transference Number and Conductivity. ACS Energy Lett. (2017), 2, 481-487.

Diederichsen, K. M.; Buss, H. G.; McCloskey, B. D. "The compensation effect in the Vogel-Tammann-Fulcher (VTF) equation for polymer-based electrolytes." Macromolecules (2017), 50 (10), 3831-3840.

Calabrese D. R.; Wenning, B. M.; Buss, H. G.; Finlay, J. A.; Fischer, D; Clare, A. S.; Segalman, R. A.; Ober, C. K. " Oligopeptide-modified hydrophobic and hydrophilic polymers as antifouling coatings." Green Materials, (2017), 5 (1) 31-43.

Su, N. C.; Buss, H. G.; McCloskey, B. D.; Urban, J. J., Enhancing Separation and Mechanical Performance of Hybrid Membranes through Nanoparticle Surface Modification. ACS Macro Letters, 4(11): 1239-1243.

Leng, Chuan; Buss, H. G.; Segalman, R. A.; Chen, Z., Surface Structure and Hydration of Sequence-Specific Amphiphilic Polypeptoids for Antifouling/Fouling Release Applications. Langmuir, 31(34): 9306-9311.

Buss, H. G.*; van Zoelen, W.*; Ellebracht, N. C.; Lynd N. A.; Fischer, D. A.; Finlay, J.; Hill, S.; Callow, M. E.; Callow, J. A.; Kramer, E. J.; Zuckermann, R. N.; Segalman, R. A., Sequence of Hydrophobic and Hydrophilic Residues in Amphiphilic Polymer Coatings Affects Surface Structure and Marine Antifouling/Fouling Release Properties. ACS Macro Letters, 3(4). 364-368.

*co first authors

Bonner, D. K.; Zhao, X.; Buss, H. G.; Langer, R; Hammond, P. T.; “Crosslinked linear polyethylenimine enhances delivery of DNA to the cytoplasm,” Journal of Controlled Release (2013), 167 (1):101-107.

Engler, A. C.; Shulka, A.; Puranam, S.; Buss, H. G.; Jreige, N., Hammond, P. T., Effects of Side Group Functionality and Molecular Weight on the Activity of Synthetic Antimicrobial Polypeptides. Biomacromolecules, 12(5): 1666-1674.

Engler, A. C.; Bonner, D. K.; Buss, H. G.; Cheung, E.; Lee, H. I.; Hammond, P. T., The synthetic Tuning of Clickable pH Responsive Cationic Polypeptides and Block Copolypeptides. Soft Matter, 7(12): 5627-5637.

Selected Presentations

Micro- and nanoplastics (MNPs) in the Workplace: Exposure Insights from Contemporary Literature (conference presentation), SPE Microplastics Forum, October 20, 2026.

Comparison of FTIR methods for microplastic and nanoplastic characterization (conference presentation and paper), SPE ANTEC, March 11, 2026.

Microplastics, the Next PFAS? Where Are We on the Science, Toxicity and Policy? (invited panelist), Business & The Environment, December 10, 2025.

Diederichsen K, Buss H, Liffland S, and Worthen AJ. Managing Risks of Sustainability and Circularity Claims. Product Stewardship Society Annual Conference (PSX), Houston, TX, September 16-18, 2025.

Challenges and Opportunities for Recycling of Medical Plastics (speaker), SPE Medical Plastics, February 5, 2024.

Advisory Appointments

CalSEED Technical Advisory Board (2017-2020)

National Academy of Sciences Roundtable on Plastics (2024-2025)

Voting Member of ASTM D20, Plastics (2020-present)

On the Subcommittee D20.95 on Recycled Plastics

Part of the ASTM E60.42 Working Group WK#88282 - 'Designing for Recyclability of Single-Use Products and Packaging used in Healthcare Applications'

Part of the ASTM #AC841 Multi-Committee Task Group on Microparticles (Microplastics)

Peer Reviews

Circularity and Plastics: Proceedings of a Workshop (2025), NASEM