



Exponent[®]
Engineering & Scientific Consulting

Erin B. Murphy, Ph.D.

Managing Scientist | Polymer Science & Materials Chemistry
149 Commonwealth Drive | Menlo Park, CA 94025
(650) 688-6790 tel | emurphy@exponent.com

Professional Profile

Trained as a synthetic organic chemist, Dr. Murphy consults at the intersection of materials science and polymer chemistry, utilizing her understanding of structure-property relationships to optimize material performance. She leverages her years in industry to solve complex product development and lead failure analysis investigations in applications spaces including consumer products, personal care products, consumer electronics, medical devices, fluid handling, and industrial plastics and elastomers. Dr. Murphy has extensive product development experience during which she has formulated, blended, compounded, and manufactured elastomeric compounds, thermoset materials, and novel polymers. She also routinely serves as a testifying expert in litigation matters involving the end-use performance of polymeric materials.

Dr. Murphy has years of hand-on experience with thermoplastic elastomers, block copolymers, reactive thermosetting resins including acrylates and epoxies, polymer composites, structured fluids, polymer micelles, polymer formulation and blending. She has worked with polymers and materials in the creation of gels, greases, composite structures, cements, thermosets, coatings, foams, membranes, lattices, and extruded and molded goods for a variety of industries and applications.

Prior to joining Exponent, Dr. Murphy spent seven years at Kraton Corporation in both research and technical management roles. Her main area of focus was on the use of styrenic block copolymers and their derivatives and compounds for use in Oil and Gas applications. She worked with major service companies and E&P operators to create new products for use in drilling and completion of new wells, workover of existing wells, and tertiary recovery applications. She developed the Oilfield Technologies team at Kraton, helping to design new polymers for use in rheology modification applications for wellbore fluids across drilling, completion, and stimulation applications as well as inventing toughened thermoset systems to be used in various zonal isolation and well integrity applications in conjunction with or in lieu of cement.

Academic Credentials & Professional Honors

Ph.D., Chemistry, University of California, Los Angeles (UCLA), 2009

M.S., Chemistry, University of California, Los Angeles (UCLA), 2006

B.S., Chemistry, California Polytechnic State University, San Luis Obispo, 2005

B.S., Biochemistry, California Polytechnic State University, San Luis Obispo, 2005

Prior Experience

Technical Leader - Oilfield Technologies, Kraton Corporation, 2016-2017

New Business Development Science Group Leader, Kraton Polymers, 2015-2016

Staff Scientist, Kraton Polymers, 2015

Senior Scientist, Kraton Polymers, 2012-2015

Scientist, Kraton Polymers, 2011-2012

Postdoctoral Research Associate, Virginia Polytechnic Institute, 2009-2011

Professional Affiliations

American Chemical Society (2005-present)

- Polymers Division
- Polymeric Materials: Science and Engineering Division
- Rubber Division

Society of Petroleum Engineers (2011-present)

Society of Plastics Engineers (2021)

Patents

Maris, C.A.L., Murphy, E., Bening, R.C., Wei, X., Muyldeans, X.D. (2020). Fusible oil gel compositions and methods of making and using same. U.S. Patent Application No. 20200399408(A1). Washington, DC: U.S. Patent and Trademark Office.

Bening, R.C., Murphy, E., Willing, C.L. (2019). Heat activated gel for cable filling applications. U.S. Patent No. 10, 287,428 B2. Heat activated gels for cable filling applications. Washington, DC: U.S. Patent and Trademark Office.

Bening, R.C., Murphy, E., Willis, C.L. (2018). Styrenic block copolymers as thermally-activated viscosifiers for oilfield applications. U.S. Patent No. 10,053,609 B2. Washington, DC: U.S. Patent and Trademark Office.

Maris, C.A.L., Murphy, E., Bening, R.C., Wei, X., Muyldeans, X.D. (2020). Fusible oil gel compositions and methods of making and using same. U.S. Patent Application No. 2018028227(A1). Washington, DC: U.S. Patent and Trademark Office.

Murphy, E.B., Nguyen, D.V., Bening, R.C. (2017). Curable, resealable, swellable, reactive sealant composition for zonal isolation and well integrity U.S. Patent No. 9,657,213 B2. Washington, DC: U.S. Patent and Trademark Office.

Murphy, E., Bening, R.C. (2016). Low fluid loss drilling fluid compositions comprising diblock copolymers U.S. Patent no. 9,394,472 B2. Washington, DC: U.S. Patent and Trademark Office.

Murphy, E.B. (2016). Low viscosity synthetic cement. U.S. Patent No. 9,238,770 B2. Washington, DC: U.S. Patent and Trademark Office.

Publications

Murphy EB. The return of photoelastic stress measurements: utilizing birefringence to monitor damage and repair in healable materials. *Journal of Materials Chemistry* 2011; 21:1438-1446.

Murphy EB, Wudl F. The world of smart healable materials. *Progress in Polymer Science* 2010; 35:223-251.

Murphy EB. Remendable Polymer Systems. In: Shinya, Norio, ed. *Frontiers of Self-Healing Materials and Applications*. Tokyo, Japan: CMC Publishing; 2010: 37-64.

Murphy EB, Bolanos E, Schaffner-Hamann, Wudl F, Nutt SR, Auad ML. Synthesis and characterization of a single-component thermally reversible polymer network: Staudinger and Stille revisited. *Macromolecules* 2008; 41 (14):5203-5209.

Braslau R, O'Bryan G, Nilsen A, Henise J, Thongpaisanwong T, Murphy E, Mueller L, Ruehl J. The synthesis and evaluation of new α -hydrogen nitroxides for 'living' free radical polymerization. *Synthesis* 2005; 9:1496-1506.

Presentations

Murphy, EB. Failure Analysis of Polymers. Stanford AA252: Techniques of Failure Analysis, June 2020. (Invited Guest Lecture).

Murphy, EB. Taking 'Learn by Doing' to the Next Level: The World of Engineering & Scientific Consulting. Cal Poly San Luis Obispo Chemistry & Biochemistry Department Seminar Series, July 2018. (Invited Speaker)

Murphy EB. Reactive Sealant Technologies as Alternative Routes to Zonal Isolation, American Association of Drilling Engineers Fluids Management Study Group Meeting, Houston, TX, February 2017. (Invited Speaker).

Murphy EB. Utilization of Block Copolymer Technology in the Oil and Gas Industry. Iowa State University Department of Chemical and Biological Engineering Graduate Seminar Series, Ames, IA, October 2015. (Invited Speaker).

Murphy, EB. Pushing the Boundaries for Hydrocarbon Extraction in the Oil & Gas Industry Through Block Copolymer Technology. 249th ACS National Meeting & Exposition, Denver, CO, March 2015. (Invited Speaker).

Murphy, EB. In Situ Crosslinked Synthetic Cement for use in Cementing and Zonal Isolation. High Performance Elastomers and Polymers in Oil & Gas Applications, Aberdeen, UK, April 2012. (Invited Speaker).

Murphy, EB, Auad, ML, Wudl, F. Stimuli-Responsive Healable Materials: Diels-Alder Based Mending, International Conference on Self-Healing Materials, Chicago, IL, June 2009.