

Exponent®
Engineering & Scientific Consulting

Corissa Lee, Ph.D.

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Professional Profile

Trained as a material scientist with a specialization in polymer science, Dr. Lee's research and experience provide a deep understanding of the chemistry, physical properties, and mechanical behavior of polymeric materials, including rubbers, elastomers, adhesives, and rigid plastics. Her areas of expertise encompass structure-property relationships, mechanics of materials, adhesion science, chemical and physical compatibility, and fractography.

Dr. Lee applies her knowledge of polymer science across a wide variety of industries, including automotive, consumer electronics, construction, medical, and industrial piping. She has worked with clients on challenges such as durability assessments, material selection and specifications, formulation development, end-use testing, product safety evaluations, and failure analysis. Her expertise in common polymer failure modes — including wear, tearing, environmental stress cracking (ESC), fatigue, creep, and weathering — is complemented by her proficiency in material characterization techniques. These include analytical and molecular-level analysis as well as bulk physical properties testing, which she has applied to commodity and engineering thermoplastics, rigid and rubber thermosets, and other industrially relevant compositions. Additionally, Dr. Lee is experienced in standardized mechanical testing, long-term durability studies, and accelerated aging evaluations.

Specializing in leading failure analysis investigations of complex material systems, Dr. Lee has addressed issues such as tire failures — including blowouts and belt tread separations — as well as failures in automotive, industrial, and construction rubber sealing components and sealants. She also has a strong background in polymer conversion processes, including injection molding, compression molding, blow molding, extrusion, and thermoforming.

Dr. Lee is an active member of the Society of Plastic Engineers (SPE), the Society of Automotive Engineers (SAE), and The Tire Society. She is also certified as an Automotive Tire Service Advanced Instructor through the Tire Industry Association (TIA).

Before joining Exponent, Dr. Lee was a research assistant in the Department of Material Science and Engineering at the University of Illinois at Urbana-Champaign and held research assignments at Xerox and Dow Corning. At Xerox, she studied the flow properties of toners, while at Dow Corning, she investigated novel block copolymer synthesis techniques. As part of the Autonomous Materials Systems group at the Beckman Institute, her research focused on mechanochemistry, incorporating force-sensitive chemical groups (mechanophores) into polyurethane elastomeric formulations. These efforts enabled the development of "smart" polymers with self-sensing (e.g., color change) and self-repairing capabilities, allowing materials to autonomically respond to environmental conditions and detect mechanical damage.

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Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, University of Illinois, Urbana-Champaign, 2013

B.S., Materials Science and Engineering, Cornell University, 2008

Prior Experience

Research Assistant, University of Illinois at Urbana-Champaign, 2008-2013

Summer Intern, Dow Corning, 2007, 2008

Research Assistant, Cornell University, 2007-2008

Summer Intern, Xerox, 2006

Professional Affiliations

Society of Plastics Engineers

Society of Automotive Engineers

The Tire Society

Languages

Cantonese Chinese

Patents

Patent No. US-2011/0294958 A1: Method of Forming a Non-Random Copolymer, December 1, 2011 (with D. Ahn, C.L. Wong).

Publications

Lee, C., Moll, J. Fractography of Polymers. In Fractography (pp. 463–480). ASM International. (2024)

Lee CK, et al. Fractographic examination and tensile property evaluation of 3D printed acrylonitrile butadiene styrene (ABS). Proceedings, ANTEC, 2015.

Lee CK, et al. Solvent swelling activation of a Mechanophore in a polymer network. Macromolecules 2014; 47(8), 2690-2694. doi:10.1021/ma500195h.

Lee CK, et al. Exploiting force sensitive Spiropyrans as molecular level probes. Macromolecules 2013; 46(10), 3746-3752. doi:10.1021/ma4005428.

Lee CK, et al. Force-induced redistribution of a chemical equilibrium. Journal of the American Chemical Society 2010; 132(45), 16107-16111. doi:10.1021/ja106332g.

Presentations

Lee C.K., Lenger M, Kreder M, Reidy C. Tire Tread Fractography: Distinguishing Tire Rubber Process Features from Failure Indicators. Global Polymer Summit — GPS, Louisville, KY, September 2026.

Lee C.K., Fitzharris E, Kreder M, Moll J. Effect of Stress, Material, and Exposure Route on ESC. International Materials Applications & Technologies Conference and Exposition — IMAT, Cleveland, OH, October 2024.

Fitzharris E, Kreder M, Lee C, Moll J. ESC Fractography: A Study Varying Stress in Two Amorphous Polymers. International Materials Applications & Technologies Conference and Exposition — IMAT, New Orleans, LA, September 2022.

Lyons C, Moll J, Lee C. Fractography of Amorphous Polymers — A Comparison of Tensile, Impact, and Environmental Stress Cracking Facture Surfaces. International Materials Applications & Technologies Conference and Exposition — IMAT, New Orleans, LA, September 2022.

Lee CK, et al. Fractographic examination and tensile property evaluation of 3D printed acrylonitrile butadiene styrene (ABS)., ANTEC, Orlando, FL, 2015.

Lee CK. Force-induced redistribution of a chemical equilibrium. 3rd International Conference on Self-Healing Materials, Bath, UK, 2011.

Lee CK. Mechanochemistry in polyurethanes. Beckman Graduate Student Seminar Series, Urbana, IL, 2010.

Lee CK. Mechanochemistry in thermoplastic polyurethane. Materials Research Society Fall Meeting, Boston, MA, 2009.

Lee CK. Mechanically activated spiropyran in thermoplastic polyurethane. Poster Presentation, 2nd International Conference on Self-Healing Materials, Chicago, IL, June 2009.

Additional Education & Training

57th Tire Mechanics Short Course. The University of Akron, Akron, OH, September 2026.

Tire Forensic Analysis (SAE Course C1424). SAE International, April 16–17, 2019.

Characterizing Elastomer Fatigue Behavior for Analysis and Engineering. Endurica LLC, 2018.

Certified Automotive Tire Service (ATS 300/400). Tire Industry Association, 2017.

Compound Mixing and Consistency. ACS Rubber Division, International Elastomer Conference, Cleveland, OH, October 11, 2017.

Essentials of Rubber Technology. ACS Rubber Division, International Elastomer Conference, Cleveland, OH, October 10, 2017.