



Exponent[®]
Engineering & Scientific Consulting

Sarah E. Parker, Ph.D.

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Professional Profile

Dr. Parker is a chemist who specializes in understanding how composition and formulation affect the performance of complex chemical systems and practical materials. She consults in the areas of fuel, oil, and lubricant formulations for automotive and industrial applications, as well as cosmetics and personal care products, pharmaceuticals, medical devices, paints and coatings, and industrial and specialty chemicals including fluorinated substances (PFAS). Dr. Parker has experience analyzing product composition and identifying potential contaminants through standardized and non-standard methods, and uses her expertise to help clients determine the source and potential impacts of chemical contamination in a range of products. Dr. Parker has also consulted for parties involved in intellectual property disputes, including trade secret and patent litigation.

Dr. Parker has investigated the quality and end-use performance of engine and machine lubricant formulations (oils and greases) and fuels, including gasoline, diesel fuel, biofuels, marine fuel, and fuel oil products. She is familiar with common quality specifications and guidelines for lubricants and fuels set by industry organizations, original equipment manufacturers (OEMs), and regulatory bodies. Dr. Parker has utilized a variety of chemical analysis methods in these investigations, including Fourier-transform Infrared spectroscopy (FTIR), gas chromatography-mass spectrometry (GC-MS), and two-dimensional gas chromatography-mass spectrometry (GCxGC-MS), as well as various elemental analysis and specialized chemical analysis methods. Dr. Parker is well-versed in ASTM and ISO methods for lubricant and fuel characterization including rheological and tribological testing related to friction and wear (tribology) issues. She is also familiar with surface characterization, profilometry, and microscopy techniques.

Dr. Parker helps clients investigate, assess, and mitigate contamination in formulated products. She is experienced in selecting appropriate sampling and analysis methods to accurately characterize the chemical composition of a product. Her expertise extends to the design and validation of new sampling and test methods utilized when appropriate standardized methods are not available. Dr. Parker uses this expertise to help clients analyze the potential past and future impacts of contamination, once identified, across a range of products including personal care products, pharmaceuticals, medical devices and assays, industrial and specialty chemicals, and petroleum products.

Dr. Parker has also worked in the area of polymeric materials and coatings, specializing in the interaction of material and coating formulations with their environments. Her experience includes the characterization and assessment of equilibrium processes such as absorption and off-gassing, as well as exposure to environmental stressors such as UV irradiation, temperature, and humidity. Dr. Parker's research experience also includes the synthesis and design of organic molecules and metal catalysts commonly used in the production of reinforced plastics and composite materials, inks and coatings, elastomers, and fine chemicals.

Prior to joining Exponent, Dr. Parker was a Senior Researcher at ExxonMobil Research & Engineering. In that role she developed new formulations for commercial vehicle (heavy-duty) engine oils and greases to meet API, ACEA, and automotive engine manufacturer specifications using a combination of industry standard bench tests, stationary fired-engine test stands, and field test programs. She explored new additives for lubricant applications including novel antioxidants, anti-wear additives, pour-point depressants, dispersants, and friction modifiers, and has contributed to patent applications related to this work. In addition, Dr. Parker provided failure analysis and lubricant product support to lubricant blenders, vehicle manufacturers, and end customers in the transportation, mining, construction, and agriculture industries. She was also involved in the technical validation and global deployment of new components and formulations with impact on product claims and specifications, the global supply chain, and product registration with foreign governments.

Academic Credentials & Professional Honors

Ph.D., Chemistry, Harvard University, 2014

B.A., Chemistry, Grinnell College, 2007

National Science Foundation Graduate Research Fellow, 2009-2012

Thomas J. Watson Fellow, 2007-2008

Archibald Prize for Highest Scholarship, Grinnell College, 2007

Chemistry Alumni Prize, Grinnell College, 2007

Barry M. Goldwater Scholar, 2005-2007

Trustee Honor Scholarship, Grinnell College, 2003-2007

Prior Experience

Senior Researcher, Industrial Lubricants & Greases, ExxonMobil Research & Engineering, 2016

Senior Researcher, Commercial Vehicle Lubricants, ExxonMobil Research & Engineering, 2014-2016

Professional Affiliations

American Chemical Society

ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants

Patents

Alessi ML, Jetter SM, Kennedy S, Parker SE, Burns RG. Lubricating oil compositions with oxidative stability in diesel engines. US Patent Application US16/171401, October 2018.

Alessi ML, Jetter SM, Kennedy S, Parker SE, Burns RG. Lubricating oil compositions with oxidative stability in diesel engines. US Patent Application US16/171401, October 2018.

Parker SE, Ritter T. 1,2-Hydrosilylation of dienes. US Patent Application US 61/772,218, March 2014.

Publications

Lee H, Campbell MG, Hernández Sánchez R, Börgel J, Raynaud J, Parker SE, Ritter T. Mechanistic insight into high-spin iron(I)-catalyzed butadiene dimerization. *Organometallics* 2016; 35: 2923-2929.

Parker SE, Börgel J, Ritter T. 1,2-Selective hydrosilylation of conjugated dienes. *Journal of the American Chemical Society* 2014; 136: 4857-4861.

Presentations

Dimitriou M, Gupta C, Parker SE, Streifel B, Vargas J, White C. Dripping Windows to Leaking Walls, Using Analytical Instrumentation to Solve Real-World Problems. Thermal Analysis Forum of Delaware Valley Polymer Characterization Short Course, 2021.

Rackl S, Worthen A., Parker S. Fluorinated Chemicals and Challenges to Product Stewardship. PSX, 2021.

Drollette BD, Millions D, Parker SE, Reitman, M. The PFAS Challenge: Beyond the Basics of PFAS in the Modern Era. Exponent Live Webinar Series, 2021.

Oelker, AM, Parker SE, Barry M. The Role of Technical Experts in Patent Litigation. American Chemical Society Fall Meeting, 2021.

Stern MC, Krill M, Parker SE, Oelker AM, Kytomaa HK. Patentable or Infringing? an Overview of Patent Infringement and Validity Concepts for Researchers and Innovators, American Institute of Chemical Engineers Spring Meeting, 2020.

Favero, CVB., Parker, S., Stern, MC. and Kytomaa, HK., Impact of Time on Asphaltene Destabilization Detection in Unconventional Fuels, American Institute of Chemical Engineers Spring Meeting, 2019.

Parker SE, Ritter T. 1,2-Hydrosilylation of 1,3-dienes at a cyclometallated platinum catalyst. Oral presentation, Organometallic Chemistry Gordon Research Seminar, 2013.

Parker SE, Ritter T. Selective 1,2-hydrosilylation of butadiene at a cyclometallated platinum-phosphine catalyst. Poster presentation, Inorganic Chemistry Gordon Research Conference, 2013.

Parker SE, Börgel J, Ritter T. Platinum-catalyzed 1,2-hydrosilylation of butadiene. Oral presentation, Boston Women in Chemistry Symposium, 2013.

Parker SE, Ritter T. Platinum-catalyzed 1,2-hydrosilylation of butadiene. Poster presentation, Boston Women in Chemistry Symposium, 2012.

Mobley TA, Parker SE. Synthesis and conformational characterization of Cp₂WHSn(CN)Ph₂. Poster presentation, American Chemical Society National Meeting, 2007.