



**Exponent**<sup>®</sup>  
Engineering & Scientific Consulting

## Eric Ouellette, Ph.D.

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### Professional Profile

Dr. Ouellette has a broad range of expertise related to medical devices including design, failure and root cause analyses, material characterization, particle analysis mechanical testing, metrology, and corrosion testing. He has researched the performance of many different orthopedic devices and supported clients across all stages of the product life cycle to evaluate their orthopedic, prosthetic, spine, combination, and craniomaxillofacial devices. His specific research interests involve fretting and corrosion of medical devices, with a particular emphasis on mechanically assisted corrosion in modular orthopedic devices.

Dr. Ouellette's work at Exponent includes analysis of retrieved modular orthopedic devices, and specifically identifying how biomechanical loading, implant design and materials factors combine with clinical and patient factors to lead to revision of implants. Employing surface characterization techniques such as scanning electron microscopy and energy dispersive spectroscopy in addition to measurement of material loss from bearing and modular interface surfaces, he has examined devices across many product lines. He is also an active member of the American Society for Testing and Materials (ASTM) and works with colleagues across the industry in standards development activities for orthopedic devices. Finally, Dr. Ouellette experienced in market research activities and has assisted clients in better understanding the competitive landscape, market drivers, and growth potential for their products and/or materials within the orthopedics space.

His prior research as a research assistant at Syracuse University included characterization of the fretting corrosion processes of modular tapers through unique test methods, development and evaluation of self-reinforced composite PEEK and UHMWPE materials, and study of the physical and mechanical properties of two-solution bone cements for use in spinal procedures.

### Academic Credentials & Professional Honors

Ph.D., Bioengineering , Syracuse University, 2016

B.S., Bioengineering, Syracuse University, 2010

### Publications

Ouellette ES, Smith SM, Gilbert JL. Self-reinforced poly(ether ether ketone) and polyethylene composite gaskets for prevention of mechanically-assisted corrosion in modular taper junctions: Seating, micromotion and short-term fretting corrosion. *J Mech Behav Biomed Mater*, 27;119:104454; 2021.

Spece H, Ouellette ES, Jones OL, MacDonald DW, Piuizzi NS, Lee GC, Mont MA, Klein GR, Kurtz SM. Fretting Corrosion, Third-Body Polyethylene Damage, and Cup Positioning in Primary vs Revision Dual Mobility Total Hip Arthroplasty. *J Arthroplasty*, 21:S0883-5403(21)00075-9; 2021.

Ouellette ES, Mali SA, Kim J, Grostefon J, Gilbert JL. Design, Material, and Seating Load Effects on In Vitro Fretting Corrosion Performance of Modular Head-Neck Tapers. *J Arthroplasty*, 34(5):991-1002; 2019.

Ouellette, E. S., Shenoy, A. A. and Gilbert, J. L. (2018), The seating mechanics of head- neck modular tapers in vitro: Load- displacement measurements, moisture, and rate effects. *J. Orthop. Res.*, 36: 1164-1172.

Ouellette ES, Gilbert JL, Properties and Corrosion Performance of Self-Reinforced Composite PEEK for Proposed Use as a Modular Taper Gasket, *Clinical Orthopedics and Related Research, Symposium: Advances in PEEK Technology*, 1-14; 2016.

Ouellette ES, Gilbert JL, Production and Characterization of Melt-Spun Poly (Ether Ether Ketone) Fibers for Biomedical Applications, *Polymer*, 63, 10-18; 2015.

### **Conference Talks**

Ouellette ES, Gilbert JL, : Fretting Corrosion Performance of Modular Tapers Fitted with Self-Reinforced Composite PEEK Gaskets, 3rd International PEEK Meeting, Washington, DC, 2017.

Gilbert JL, Grostefan J, Mali S, Kim J, Ouellette ES, "An Assessment of Seven Design, Material and Surgical Factors on the Fretting Corrosion of Head-Neck Modular Taper Junctions: Multifactorial Design of Experiment Study", *ISTA Annual Congress*, Boston, MA, 2016.

Ouellette ES, Gilbert JL, "Production and Characterization of Melt-Spun Poly (Ether Ether Ketone) Fibers for Biomedical Applications", *Proceedings at annual meeting of Society for Biomaterials*, Boston, MA, April 2013.

### **Conference Posters**

Ouellette ES, Shenoy A, Gilbert JL. Influence of seating load, loading rate, and design parameters on the connection strength of modular tapers. *Proceedings at World Biomaterials Congress*, May, 2016.

Ouellette ES, Gilbert JL. Thin film self-reinforced composite PEEK: Characterization and evaluation as a potential orthopedic biomaterial. *Proceedings at 2nd International PEEK Meeting*, Washington DC, April, 2015.

Ouellette ES, Gilbert JL. Self-reinforced composites for prevention of fretting corrosion of biomedical alloys: Electrochemistry and surface characterization. *Proceedings, Society for Biomaterials Annual Meeting*, Denver, CO, April 2014.

Sivan SS, Ouellette ES, Gilbert JL. Cathodic voltage preconditioning of Ti-6Al-4V in media affects MC3T3 pre-osteoblast cell viability. *Proceedings, Society for Biomaterials Annual Meeting*, Seattle, WA, 2010.