Jonathan Bender, Ph.D.

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134 Chapel Rd, PO Box 1098 Sweet Briar, VA 24595

Expertise

Lubricant formulation and testing, foam and air entrainment, rheology, tribology (friction, wear, failure analysis of bearings, clutches, gears), eMobility fluids, gasoline and diesel additives, colloidal suspensions

Education

PhD Chemical Engineering, University of Delaware, Newark, DE 1995
"Reversible shear thickening in mono disperse and bidisperse colloidal dispersions," J. Rheology 40 899 (1996)
Thesis advisor Norman Wagner. Amoco fellow. First to explain how and why concentrated suspensions shear thicken, leading to the design of prototype improved bullet proof vests. Seminal paper cited 550+ times.

BS Chemical Engineering, University of Virginia, Charlottesville, VA 1986 with distinction

Experience

DIRECTOR, MARGARET WYLLIE '45 ENGINEERING PROGRAM, SWEET BRIAR COLLEGE – 2022-PRESENT
PROFESSOR OF ENGINEERING

Responsible for developing and executing a strategy to expand departmental educational opportunities through collaborations with research universities, industry, and government.

Responsible for increasing engineering student enrollment via high school student outreach efforts, community college partnerships, and external funding for improving underserved population outcomes.

AFTON CHEMICAL CORPORATION, ADVISOR E-MOBILITY FLUIDS 2022

Developed Afton's e-Mobility technical roadmap, focused on direct heat transfer fluids for passenger car and heavy-duty electric vehicle lubricant needs

AFTON CHEMICAL CORPORATION, DIRECTOR OF FUELS ADDITIVES R&D — 2018–2021

Led group of scientists in delivering high-value fuel additive products to global refiners, supporting $250+ million/year in sales

Developed, resourced and executed multi-year strategic technical roadmaps to deliver long-range business goals. Responsibility included assisting regional managers in developing customer engagement strategies.

Drove negotiations for formal joint development agreements (JDAs) and led semi-annual steering team meetings with customers to align and progress collaborative projects.

Fostered innovation, regularly leading brainstorming sessions, resulting in patents and trade secrets.

AFTON CHEMICAL CORPORATION, SR MANAGER OF ENGINE OIL ADDITIVES R&D — 2017-2018

Rebuilt engine oil R&D team. Mentored and coached team to deliver a highly profitable, next generation engine oils in record time. Members developed mutual trust, motivation to succeed, and shared commitment to go above and beyond expectations.

AFTON CHEMICAL CORPORATION, MANAGER OF DRIVELINE ADDITIVES R&D, 2007-2016

Led a small team with the goal of sustaining and growing Afton's nascent business in construction and agriculture lubricant business. Growth rate was 15% per year.

Formulated a highly competitive construction driveline lubricant that generates several million dollars in sales annually. Patent issued.

Initiated strong collaborations between Afton and the largest construction and agriculture equipment manufacturers in Europe, North America, China, India, and Japan, some of which have led to on-going business.

ASSISTANT PROFESSOR OF CHEMICAL ENGINEERING, UNIVERSITY OF SOUTH CAROLINA, 2002-2007

Research focus on characterizing friction at a nanometer scale using atomic force microscopy

NSF CAREER Awardee, competitive funding given to the top new faculty in engineering

Research supported by Infineum Corporation, the Petroleum Research Fund as well as the NSF

Awarded for excellence in teaching: Thermodynamics, Fluid Mechanics, and Bioengineering

Developed USC's first bioengineering course, invited guest speakers and took students on field trips

Developed a summer short course in physics to better prepare first-time high school science teachers in underserved communities to teach physics

POST-DOCTORAL STUDENT, PHYSICS AND MATERIALS SCIENCE, NC STATE UNIVERSITY, 2000-2002

Researched tribological reactions using quartz crystal microgravimetry and characterized quantum tunneling in III-V semiconductor blue LEDs to resolve an intellectual property dispute.

LORD CORPORATION, SR SCIENTIST, CARY, NC 1996-2000

Conducted scale-up feasibility of magnetorheological fluids, which reversibly solidify under a magnetic field and are used in active vibration dampening.

INFINEUM CORPORATION, ATF FORMULATOR, LINDEN, NJ, 1994-1996

Initiated research in continuously variable transmission lubrication. Predicted and confirmed that base oil traction was critical to performance.

AIR PRODUCTS AND CHEMICALS, COMMISSIONING ENGINEER, ALLENTOWN, PA 1986-1990

Ensured proper construction, on-time start-up, and continued operation of 10 cryogenic air separation, hydrogen, helium, and landfill gas recovery plants across the US.

Publications

LUBRICATION, RHEOLOGY

Friction modifiers
JW Bender - Encyclopedia of Tribology, 2013

E-FiRST: Electric field responsive shear thickening fluids
SS Shenoy, NJ Wagner, JW Bender - Rheologica acta, 2003 Citations 27

Properties and Applications of Commercial Magnetorheological Fluids
MR Jolly, JW Bender, JD Carlson – Journal of Intelligent Systems and Structures, 10(1), 1999

Reversible shear thickening in monodisperse and bidisperse colloidal dispersions
J Bender, NJ Wagner - Journal of Rheology, 1996

Optical measurement of the contributions of colloidal forces to the rheology of concentrated suspensions

JW Bender, NJ Wagner - Journal of colloid and interface science, 1995

SURFACE PROBE MICROSCOPY

Combined atomic force microscopy and scanning tunneling microscopy imaging of cross-sectioned GaN light-emitting diodes
JW Bender, ME Salmon - The Journal of Scanning, 2003

NANOTRIBOLOGY

Friction dependence on α-relaxations in a tethered polymer monolayer
J Jia, JW Bender - Nano letters, 2007

A study of the nanotribological fatigue of ultra-high molecular weight polyethylene
C Gibbs, JW Bender - Tribology Letters, 2006 - Springer

Synthesis and characterization of compound-curved graphite
SM Winder, D Liu, JW Bender - Carbon, 2006 - Elsevier

Applications of the piezoelectric quartz crystal microbalance for microdevice development
JW Bender, J Krim - Microscale Diagnostic Techniques, 2005

Bridging the gap between macro-and nanotribology: a quartz crystal microbalance study of tricresylphosphate uptake on metal and oxide surfaces
M Abdelmaksoud, JW Bender, J Krim - Physical review letters, 2004

Nanotribology of a vapor-phase lubricant: A quartz crystal microbalance study of tricresylphosphate (TCP) uptake on iron and chromium
M Abdelmaksoud, JW Bender, J Krim - Tribology Letters, 2002

BIORHEOLOGY

A biomechanical and morphologic analysis of capsule formation around implanted piezoelectric wafer active sensors in rats treated with cyclooxygenase-2 inhibition
HI Friedman, V Giurgiutiu, J Bender - Annals of plastic surgery, 2008

The use of biomedical sensors to monitor capsule formation around soft tissue implants
JW Bender, HI Friedman, V Giurgiutiu - Annals of Plastic Surgery, 2006

Electromechanical Impedance Sensor for In Vivo Monitoring the Body Reaction to Implants
V Giurgiutiu, H Friedman, J Bender, T Borg, MJ Yost, W Newcomb – Journal of Investigative Surgery, 2004