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Paul Shiller

curriculum vitæ

Education

1991 **PhD Physical Chemistry**, *Case Western Reserve University*, Cleveland, OH, Advisor: Dr. A. B. Anderson.

1987 **MS Chemistry**, *Youngstown State University*, Youngstown, OH, Advisor: Dr. D. Mincy.

1984 **MS Chemical Engineering**, *Case Western Reserve University*, Cleveland, OH, Advisor: Dr. J. C. Angus.

1980 **BE Chemical Engineering**, *Youngstown State University*, Youngstown, OH, Minor: Mathematics, Chemistry, Nuclear Engineering.

Appointments

2011 – **Research Scientist**, *The University of Akron*, Akron, OH, Civil Engineering Department.

2004 – 2011 **Tribological Specialist**, *The Timken Co.*, Canton, OH.

1998 – 2004 **Senior Chemist**, *DELPHI Corporation*, Warren, OH.

1984 – 1998 **Senior Chemist**, *General Motors, Packard Electric Division*, Warren, OH.

1983 – 1984 **Process Engineer**, *PanelVision Corporation*, Pittsburgh, PA.

1980 – 1981 **Research Engineer**, *The General Tire & Rubber Company*, Akron, OH.

Publications, Patents, and Books

2016 P Shiller. "Chapter 6: Which Grease to Use When". In: *NLGI: Lubricating Grease Guide*. Ed. by W. Tuszynski. Kansas City, MO: NLGI.

2015 P. Shiller and C. Hager. *Boron soap compounds for lubricating grease compositions*. U.S. provisional patent application: 62/221,745.

TJ. Zolper et al. "Correlation of Polysiloxane Molecular Structure to Shear-Thinning Power-Law Exponent Using Elastohydrodynamic Film Thickness Measurements". In: *Journal of Tribology* 137.3, pp. 031503–031503. ISSN: 0742-4787. DOI: `10.1115/1.4029940`. URL: `http://dx.doi.org/10.1115/1.4029940`.

2013 G. Doll et al. *Anti-fretting rust preventative solution used for non-lubricated contact surfaces of bearing assembly, comprises rust preventative fluid and anti-fretting additive dissolved in fluid and comprising surface active compound*. Patent Number: WO2013141959-A1.

2012 R. Evans et al. *Apparatus and Method for Controlled Release of Lubricant Additives in Bearings and Gear Assemblies*. Patent Number: US20120170883-A1.

2011 R. D. Evans, P. J. Shiller, and J. Y. Howe. "Adhesion of tungsten carbide reinforced amorphous hydrocarbon thin films (WC/a-C:H) to steel substrates for tribological applications". In: *Journal of Applied Physics* 109.2, pp. 023518–6. DOI: 10.1063/1.3544045. URL: http://link.aip.org/link/?JAP/109/023518/1.

Jr. Hager C. H. et al. "Minimum quantity lubrication of M50/M50 and M50/Si(3)N(4) tribological interfaces". In: *Wear* 271.9-10, pp. 1761–1771. DOI: 10.1016/j.wear.2011.01.094.

P Shiller. "Measuring the "Worms" in Grease". In: *NLGI Spokesman* 74.6, pp. 18–26.

2010 BD Leonard et al. "Fretting of WC/a-C:H and Cr2N Coatings Under Grease-Lubricated and Unlubricated Conditions". In: *Tribology Transactions* 53.1, pp. 145–153. DOI: 10.1080/10402000903312323.

2007 S. Kuppuraju et al. *Spherical roller bearing assembly has sealing materials which are carried by seal case bears against sealing surface on inner race to form multi stage sealing contact*. Patent Number(s): WO2007127851-A1; EP2181272-A1; US2010150486-A1.

2003 AB Anderson et al. "Theoretical calculation of activation energies for $Pt + H_{(aq)} + e^-(U) \leftrightarrow Pt - H$: Activation energy-based symmetry factors in the marcus normal and inverted regions". In: *Journal of Physical Chemistry B* 107.19, pp. 4618–4623. DOI: 10.1021/jp0271099.

AB Anderson et al. "Theoretical calculation of activation energies for $Pt + H_{(aq)} + e^-(U) \leftrightarrow Pt - H$. Activation energy-based symmetry factors in the Marcus normal and inverted regions." In: *Abstracts of Papers of the American Chemical Society* 225, U633–U633.

2002 AB Anderson et al. "Mechanism for the electrooxidation of water to OH and O bonded to platinum: quantum chemical theory". In: *Electrochimica Acta* 47.18, pp. 2999–3008. DOI: 10.1016/S0013-4686(02)00203-7.

RA Sidik et al. "Quantum mechanical calculation of the symmetry factors for the underpotential deposition of hydrogen and its oxidation on Pt." In: *Abstracts of Papers of the American Chemical Society* 223, U428–U428.

1998 AB Anderson and P Shiller. "Mechanism for oxidative dissolution of a Cr atom from a Pt surface: Molecular orbital theory". In: *Journal of Physical Chemistry B* 102.15, pp. 2696–2698. DOI: 10.1021/jp973193u.

1996 AB Anderson and P Shiller. "Dehydrogenation of methoxy adsorbed on Pt(111) and Cr(110): The stabilizing effect of the more electropositive surface". In: *Surface Science* 345.3, pp. 274–280. DOI: 10.1016/0039-6028(95)00901-9.

1995 AB Anderson, E Grantscharova, and P Shiller. "On the lack of activity of substitutional Sn atoms toward the electrooxidation of CO on Pt anodes - molecular-orbital theory". In: *Journal of the Electrochemical Society* 142.6, pp. 1880–1884. DOI: 10.1149/1.2044209.

1993 P Shiller and AB Anderson. "Dehydrogenation of adsorbed methoxy on clean and oxidized metals - an electronic effect and its implications". In: *Journal of Physical Chemistry* 97.1, pp. 189–192. DOI: 10.1021/j100103a032.

1992 P Shiller and AB Anderson. "Potential dependence of CO oxidation by H_2O on a Pt anode - a molecular-orbital theory". In: *Journal of Electroanalytical Chemistry* 339.1-2, pp. 201–210. DOI: 10.1016/0022-0728(92)80452-A.

1991 P Shiller and AB Anderson. "Thermal generation of $CH_3\cdot$ from CH_3OH adsorbed on oxygen-covered Mo(110) - C-O bond strength considerations from molecular-orbital theory". In: *Journal of Physical Chemistry* 95.3, pp. 1396–1399. DOI: 10.1021/j100156a067.

1990 P Shiller and AB Anderson. "Effects of chemisorbed and substitutional 0, I, and II-Ge, Sn, and Pb on CO adsorption on Pt(111) - molecular-orbital theory". In: *Surface Science* 236.3, pp. 225–232. DOI: 10.1016/0039-6028(90)90469-0.

1989 AB Anderson et al. "Bonding in transition-metal silyl dimers - molecular-orbital theory". In: *Organometallics* 8.10, pp. 2320–2322. DOI: 10.1021/om00112a007.

1987 PJ Shiller and DW Mincey. "The monitoring of electrochemical reactions employing infrared-absorption spectrometry". In: *Abstracts of Papers of the American Chemical Society* 193, 142–COLL.

1984 JC Angus et al. "Composition and properties of the so-called diamond-like amorphous-carbon films". In: *Thin Solid Films* 118.3, pp. 311–320.

Awards and Honors

2016 Outstanding STLE Small Local Section award presented to the Canton section; executive committee member

2009 Shell Award for Instructor Excellence, National Lubrication Grease Institute

1980 Professional Promise Award, AIChE

Inducted into Phi Lambda Upsilon, Chemistry honor society

Inducted into Omega Chi Epsilon, Chemical Engineering honor society

Inducted into Tau Beta Pi, Engineering honor society

Graduated Summa Cum Laude from Youngstown State University

Grants and Fellowships

2016 Rheology under high-pressure: the effects on the network formation of high molecular weight polymers in oils.

Investigate the thermal cracking characteristics with respect to gasoline reformulation. Industrial sponsor. Novus Co.

Rheological and tribological studies of a fluorinated lubricant additive. OMNOVA Solutions

Develop Boron Soap Thickened grease. The Timken Company

2015 Lubrication Additive Activation. Center for Surface Engineering and Lubrication Research

2012 Properties of Lubricants Related to Bearing Performance. The Timken Company

Fundamental Studies of Tribological and Solid Lubricant Coatings. The Timken Company

Conference Activities

2016 B. LotfizadehDehkordi, G. Doll, P. Shiller, K. Mistry, High *Pressure Viscosity and Tribology of Lubricants with Viscosity Modifiers Additives*, STLE Annual Meeting.

A. Saatchi, P. Shiller, K. Mistry, C. HagerG. Doll, *Fretting and Scuffing Wear of Grease Lubricated Bearing Steel Contacts*, STLE Annual Meeting.

P. Shiller, M. Smith, G. Doll, A. Greco, *Pressure Dependence of Wind Turbine Gearbox Oil Viscosity*, STLE Annual Meeting.

M.A. Seeley, P. Shiller, G. Doll, *Additive Interactions on Surfaces via Temperature Programmed Desorption*, STLE Annual Meeting Student Poster Presentation.

A. Saatchi, P. Shiller, G.L. Doll, K. Mistry, *A Fundamental Study of Bleed Mechanism in Fretting Contact*, STLE Annual Meeting Student Poster Presentation; Platinum award winner.

J. A. Fouts, B. Tury, P. J. Shiller, T. W. Scharf, G. L. Doll, *Evaluation of ZnO and Al-Doped ZnO Thin Films as Sensor Materials for Sulfur Concentrations in Fuel*, Society of Vacuum Coaters Technical Conference.

2015 J. Fouts, G. Doll, R. Evans, and P. Shiller, *On the Tribochemical Wear of Hydrogen-Containing Diamondlike Carbon in Oils with EP Additives*, STLE Annual Meeting.

B. LotfizadehDehkordi, G. Doll, A. Martini, K. Mistry, U. Ramasamy, and P. Shiller *Pressure-Temperature Viscosity Measurements and Simulations of Polymer Additives in Lubricant*, STLE Annual Meeting.

A. Saatchi, G. Doll, K.. Mistry, and P. Shiller, *Studies of the Oil Release Mechanism in Non-Soap Thickened Grease*, STLE Annual Meeting.

B. LotfizadehDehkordi, G. Doll, A. Martini, K. Mistry, U. Ramasamy, and P. Shiller, *Pressure-Temperature Viscosity Measurements and Simulations of Lubricants with Polymer Additives*, STLE Annual Meeting Poster Session.

2014 B. LotfizadehDehkordi, B. Tury, P.J. Shiller, G.L. Doll, *High pressure- and temperature-dependent viscous anomalies in polymer oil mixtures*, Society of Rheologists Annual Meeting, Philadelphia, PA.

B. LotfizadehDehkordi, B. Tury, P.J. Shiller, G.L. Doll, *Temperature Dependent, High Pressure ViscosityMeasurements of PAO/Polymer Mixtures*, STLE Annual Meeting Student Poster Presentation.

A. Saatchi, B. Tury, P.J. Shiller, G.L. Doll, *The Effect of Bleed Rate on Sliding and Rolling Contact Fretting Wear*, STLE Annual Meeting Student Poster Presentation.

J. Fouts, B. Tury, P.J. Shiller, G.L. Doll, *Wear of WC/α:CH Coatings with Common Gearbox Oil Additives*, STLE Annual Meeting Student Poster Presentation.

2012 Shiller, P, Hager, C., *The Effects of Grease Composition on Fretting Wear*, Presented at the 67th STLE Annual Meeting, St. Louis, MO.

Shiller, P., *Measuring the "Worms" in Grease*, NLGI Annual Meeting, Tucson, AZ.

2008 Shiller, P., *The Effects of Boron Additives in Grease on Fretting Wear*, NLGI Annual Meeting, Williamsburg, VA.

2003 Anderson, Alfred B., Sidik, Reyimjan A., Narayanasamy, Jayakumar, Shiller, Paul *Theoretical Calculations of Activation Energies for* $Pt + H_{(aq.)} + e^{-}(U) \leftrightarrow Pt - H$*: Activation Energy-Based Symmetry Factors in the Marcus Normal and Inverted Regions.* 225th ACS National Meeting.

2002 Sidik, R. A.; J. Narayanasamy; Anderson, A. B. and Shiller, P. *Quantum Mechanical Calculations of the Symmetry Factors for the Underpotential Deposition of Hydrogen and its Oxidation on Pt*, 223rd ACS National Meeting.

1999 Shiller, P. J. and Brower, S. *Orientation and Interaction of DR1 Dye in a Polymer Matrix, Poster Presentation*, The Pittsburgh Conference.

1995 Shiller, P. J. and Anderson, A. B. *Decomposition of Methoxy on Metal Surfaces: Molecular Orbital Study*, Presented at the 27th Central Regional Meeting of the American Chemical Society.

Teaching Experience

The University of Akron

2014 – **Basic Chemistry, Lecture and lab**.

Society of Tribologists and Lubrication Engineers

2016 – **Advanced Lubrication 302: Advanced Lubrication Regimes**.

2011 – **NLGI Grease 101**.

2009 – **Basic Lubrication 102: Basic Applications**.

National Lubricating Grease Institute

2011 – **Condition Monitoring**.

2009 – **Advanced Lubrication**.

Basic Lubrication.

Kent State University

2006 – 2010 **Basic Organic Chemistry**.

2004 – 2010 **Fundamentals of Chemistry**.

2004 – 2006 **Chemistry in Our World**.

Service to Profession

2014 – **ASTM D02 Committee**.

2015 – 2018 **ACS Division of Colloids and Surface Chemistry, Alternate Councilor**.

2014 – 2017 **STLE Lubrication Fundamentals technical committee**.

2009 – 2017 **STLE Canton Section Executive Committee**.

2016 **STLE Lubrication Specialist Education and Training Committe**.

2009 – 2014 **STLE Grease Technical Committee**.

Outreach

2015 – **Tribology 101**, $2\frac{1}{2}$ *day workshop covering the fundamentals of tribology.*

Webinars

Bearing Damage Analysis.

Grease Selection for Rolling Element Bearings.

Grease and Oil Lubrication Failure Analysis.

Bearing Damage Analysis Part II: Beyond Rolling Elements.

Grease Chemistry: Micelle Formation.

Professional Memberships

American Chemical Society (ACS).

Society of Tribologists and Lubrication Engineers (STLE).

Society of Rheologists (SOR).