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Meredith Sellers, Ph.D., P.E., CEng

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Professional Profile

Dr. Sellers leverages her chemical engineering expertise to evaluate and investigate failures associated with material properties, processing, and performance. As a Licensed Professional Chemical Engineer and Chartered Chemical Engineer, she assists clients in the oil and natural gas industries as well as in the aerospace, microelectronics, and consumer products industries.

She has particular interests in integrity management and process safety, especially as they relate to material selection and monitoring. Dr. Sellers specific expertise includes:

- Damage mechanisms (corrosion, stress corrosion cracking, hydrogen embrittlement) affecting process piping and vessels at refineries, offshore platforms, and LNG facilities
- Natural gas utility integrity management
- Investigation of petroleum, natural gas, and chemical loss of containment incidents
- Piping inspection in accordance with federal/international code requirements and industry standards (API, NACE, ASME)
- Semiconductor device fabrication
- Cleanroom processing techniques, including tool performance and optimization
- Consumer products, including consumer electronics and medical devices

Dr. Sellers has significant experience assisting clients engaged in domestic and global legal disputes (international arbitration).

Prior to joining Exponent, Dr. Sellers was a postdoctoral researcher at the US Army Engineer Research and Development Center - Construction Engineering Research Laboratory (ERDC-CERL), where she developed and evaluated carbon nanotube, graphene, and metal oxide-based supercapacitors. Her contributions towards an integrated wind-based generator system were recognized via Army Research and Development Outstanding Technical Achievement, ERDC Research and Development Achievement Awards, and two granted US patents.

Dr. Sellers received her doctoral degree from the University of Illinois at Urbana-Champaign (UIUC) in 2011. Her thesis research focused on the chemical vapor and atomic layer deposition (CVD/ALD) of titanium dioxide and the optimization of its electrical properties for photocatalysis and supported metal catalysis. To accomplish this, she performed extensive materials characterization using X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), and scanning electron microscopy/energy dispersive X-ray spectroscopy (SEM/EDS). While at UIUC, she co-authored a textbook entitled "Charged semiconductor defects: Structure, thermodynamics, and diffusion" detailing the state of knowledge regarding ionized defects in Group IV, III-V, and oxide semiconductors.

Before entering graduate school, Dr. Sellers held research appointments in the Micro-Total-Analytical Systems and Entry Control & Contraband Detection Technologies organizations at Sandia National Laboratories and in the Department of Chemistry at University College London.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, University of Illinois, Urbana-Champaign, 2011

M.S., Chemical Engineering, University of Illinois, Urbana-Champaign, 2008

B.S., Chemical Engineering, Cornell University, 2005

Harry G. Drickamer Research Fellowship, UIUC 2009-2010

National Science Foundation Graduate Research Fellowship 2006-2009

BP Fellow, UIUC 2005-2006

Licenses and Certifications

Professional Engineer Chemical, California, #6642

Professional Engineer, Colorado, #PE.0053689

Professional Engineer Chemical and Mechanical, Illinois, #062.077144

Professional Engineer Chemical, Minnesota, #52321

Certified Risk Based Inspection Professional, American Petroleum Institute, API 580

NACE Certified Corrosion Technician

OSHA 24-Hour HAZWOPER Certificate

Prior Experience

ORISE Postdoctoral Program Participant, US Army Engineer Research and Development Center, Construction Engineering Research Laboratory, 2011-2012

Graduate Research Assistant, University of Illinois at Urbana-Champaign, Department of Chemical and Biomolecular Engineering, 2005-2011

Instructional Laboratory Developer and Teaching Assistant, University of Illinois at Urbana-Champaign, Department of Chemical and Biomolecular Engineering, 2006-2009

Student Intern, Sandia National Laboratories, 2004, 2005

Honorary Research Associate, University College London, Department of Chemistry, 2003

Professional Affiliations

American Institute of Chemical Engineers

Materials Research Society

Society of Women Engineers

Association for Women in Science

Association for Materials Protection and Performance

Languages

French (France)

Patents

Marsh CP, Sellers MCK, Zussblatt NP. Polymer Supercapacitor and Method of Manufacture. U.S. Patent Number 9,922,776 B2, March 20, 2018.

Marsh CP, Pagan-Vazquez A, Feickert CA, Averbuch A, Sellers MCK, Foster CJ, Lux SM, Hesterberg J, Friedl A, Magerko JA. Fluid Generator System. U.S. Patent Number 10,256,698 B2, April 9, 2019.

Publications

Sellers MCK, Seebauer EG. Persistent illumination-induced changes in polycrystalline TiO_2 majority carrier concentration. Materials Letters 2016; 162:20-23.

Sellers MCK, Seebauer EG. Room temperature ferromagnetism in Mn-doped TiO2 nanopillar matrices. Materials Letters 2014; 114:44-47.

Sellers MCK, Castle BM, Marsh CP. Three-dimensional manganese dioxide-functionalized carbon nanotube electrodes for electrochemical capacitors. Journal of Solid State Electrochemistry 2013; 17:175-182.

Sellers MCK, Seebauer EG. Investigation of nanostructured TiO2 surface and interface electric fields with photoreflectance spectroscopy. AIChE Journal 2013; 59:1049-1055.

Sellers MCK, Zussblatt NP, Marsh CP. Potassium perruthenate-treated carbon nanotube sheets for flexible supercapacitors. Electrochemistry Communications 2012; 18:58-61.

Sellers MCK, Seebauer EG. Manipulation of polycrystalline TiO2 carrier concentration via electrically active native defects. Journal of Vacuum Science & Technology A 2011; 29:061503.

Sellers MCK, Seebauer EG. Structural and magnetic properties of Mn-doped anatase TiO2 films synthesized by atomic layer deposition. Applied Physics A 2011; 104:583-586.

Sellers MCK and Seebauer EG. Measurement method for carrier concentration in TiO2 via the Mott-Schottky approach. Thin Solid Films 2011; 519:2103-2110.

Invited Reviews

Seebauer EG, Kratzer MC. Charged point defects in semiconductors. Materials Science and Engineering: R 2006; 55:57-149.

Books

Seebauer EG, Kratzer MC. Charged Semiconductor Defects: Structure, Thermodynamics, and Diffusion. Engineering Materials and Processes Series, London, Springer-Verlag, 2009.

Published Proceedings

Lux S, Foster CJ, Sellers MCK, Friedl AP, Feickert C, Hesterberg J, Marsh CP. Generative textiles for non-rotary power production from wind. ASME 6th International Conference on Energy Sustainability Proceedings, 2012; 44816, Parts A and B:1415-1422.

Sellers MCK, Zussblatt N, Friedl AP, Marsh CP. Design of flexible supercapacitors using metal oxide-decorated carbon nanotube sheet. Materials Research Society Symposium Proceedings, 2012; 1388:mrsf11-1388-f14-02.

Sellers MCK, Friedl AP, Lux S, Feickert C, Hesterberg J, Morefield S, Marsh CP. Conductive textiles for non-rotary electrical generation from wind. US Army Corps of Engineers Research and Development Conference Proceedings, 2011.

Non-Refereed Journal Articles

Sellers, MCK In: Revisiting the future of chemical engineering. Westmoreland PR and C McCabe (eds), Chemical Engineering Progress 2018; 114 (10): 26-38.

Kratzer MC In: Chemical engineering in the next 25 years. Westmoreland PR (ed), Chemical Engineering Progress 2008; 104 (11):31-41.

Spiers H, Pankhurst Q, Parkin I, Caruana D, Kratzer MC. Thermal imaging studies of the SHS Preparation of MgFe2O4. International Journal on Self-Propagating High-Temperature Synthesis 2004; 13: 205.

Conference Presentations

Sellers MCK, Richards, AE. The Rainham Chemical Works Explosion: A 100th Anniversary Perspective. Materials Science & Technology 2016, Salt Lake City, UT, October 23-27, 2016.

Lux S, Marsh CP, Feickert, CA, Sellers MCK, Friedl AP, Pagan-Vazquez A, Foster CJ, Hesterberg JR, Magerko JA. Generative textiles for non-rotary power production from wind. ASME 2012 6th International Conference on Energy Sustainability, San Diego, CA, July 23-26, 2012.

Sellers MCK, Zussblatt N, Friedl A, Lux S, Hesterberg J, Feickert C, Morefield S, Marsh CP. Design of flexible supercapacitors using metal oxide-decorated carbon nanotube sheet. MRS Fall Meeting, Boston, MA, November 28-December 2, 2011.

Sellers MCK, Seebauer EG. Nanostructured Mn-doped TiO2 synthesized by atomic layer deposition for spintronics applications. AIChE Annual Meeting, Salt Lake City, UT, November 7-12, 2010.

Sellers MCK, Nasim F, Bhatti AS, Seebauer EG. Transient behavior of defects at TiO2 interfaces. AIChE Annual Meeting, Salt Lake City, UT, November 7-12, 2010.

Sellers MCK, Seebauer EG. Structural and magnetic properties of anatase Mn-doped TiO2 film synthesized by atomic layer deposition. AVS 57th International Symposium, Albuquerque, NM, October 17-22, 2010.

Sellers MCK, Nasim F, Bhatti AS, Seebauer EG. Improvement of metal oxide catalyst reactivity by modification of surface Fermi level. AIChE Annual Meeting, Nashville, TN, November 8-13, 2009.

Kratzer MC, Seebauer EG. Characterization of metal oxide electrical properties for band engineered catalysis. AIChE Annual Meeting, Philadelphia, PA, November 16-21, 2008.

Spiers H, Kratzer MC. Thermal imaging studies of the SHS Preparation of MgFe2O4. International Symposium on Self-Propagating High-Temperature Synthesis, Krakow, Poland, July 2003.

Posters

Nasim F, Sellers MCK, Bhatti AS, Seebauer EG. Charge buildup and optical studies of electric fields at oxide-silicon interfaces. RAK-CAM International Workshop on Advanced Materials, Ras Al Khaimah, United Arab Emirates, February 21-23, 2010.

Sellers MCK, Nasim F, Bhatti AS, Seebauer EG. Improvement of metal oxide catalyst reactivity by modification of surface Fermi level. AVS 56th International Symposium, San Jose, CA, November 8-13, 2009.

Kratzer, MC, Seebauer EG. Characterization of metal oxide electrical properties for band engineered catalysis. AVS 55th International Symposium, Boston, MA, October 24-29, 2008.

Kratzer, MC, Seebauer EG. Growth and characterization of TiO2 for band engineered catalysis. AAAS Annual Meeting, Boston, MA, February 14-17, 2008.

*Also as Kratzer MC and Sellers MCK

Peer Reviews

Electronics Letters

Applied Surface Science