

Kevin C. White, Ph.D.
Senior Managing Scientist**Professional Profile**

Dr. Kevin White is a Senior Managing Scientist in Exponent's Mechanics and Materials practice. His core discipline is chemistry with emphasis on electrochemistry, polymer chemistry, and the intersection of the two. Dr. White has extensive experience in electrochemical energy conversion, chemical/material interactions, diffusion, and migration based mass transport and corrosion. His specialties include battery science, mass transport in polymers, localized corrosion processes, and interfacial chemistry/electrochemistry. Dr. White addresses challenges related to battery technology, including: battery-device relationships, electrode material selection and testing, cell design and evaluation, performance degradation, cell safety, accelerated lifetime testing, failure analysis, and due diligence technology evaluation. These skills are applied to a range of cell chemistries including: lithium-ion, lithium primary, lead acid, nickel-metal hydride, nickel cadmium, and alkaline primary. His polymer science practice includes processing, chemical resistance, material selection, mass transport evaluation (with particular emphasis on electric voltage driven mechanisms resulting in metal dendrite formation), and failure analysis. In the field of corrosion, Dr. White consults on surface treatments and coatings, and the corrosion processes related to their failure.

Prior to joining Exponent, Dr. White was a Principal Research Scientist at Physical Sciences Inc. (PSI). His research and development efforts focused on novel architectures and materials for advanced lithium ion batteries, chemistry, and coatings for corrosion inhibition in harsh environments and novel polymer processing techniques. His research yielded a patent for a novel electrochemical energy device with power density characteristic of electrochemical capacitors and energy density characteristic of lithium ion batteries, and patent applications for a high energy metal oxide/conducting polymer composite cathode system for lithium ion batteries and novel structural electrode designs for lithium-ion batteries. In addition, Dr. White advanced anti-corrosion coatings for mild steel reinforcement in concrete for marine environments and the processing of polymers in functional, application driven nanoscale geometries.

Dr. White is a former NASA Fellow and is an active member of the Electrochemical Society serving as Chairman of the New England Section.

Academic Credentials and Professional Honors

Ph.D., Electrochemistry, University of Wyoming, 2000
B.S., Chemistry, Michigan State University, 1994

Visiting Scholar, University of Sao Paulo, Brazil, 1999
NASA Space Grant Fellowship, 1996-1997

Patents

United States Patent 7,709,139 B2: Three Dimensional Battery, May 4 2010.

Patent Application No. 12/272,157: High Energy Composite Cathodes for Lithium-ion Batteries, filed December 12, 2008.

Patent Application No. 12/193,482: Carbon Foam Based Three-Dimensional Batteries and Methods, filed August 18, 2008 (with White KC and Newman A).

Publications

Mikolajczak C, Harmon J, Hayes T, Megerle M, White K, Horn Q, Wu M. Li-ion battery cell failure analysis: The significance of surviving features on copper current collectors in cells that have experienced thermal runaway. Proceedings, 25th International Battery Seminar & Exhibit for Primary & Secondary Batteries, Small Fuel Cells, and Other Technologies, Fort Lauderdale, FL, March 17–20, 2008.

White KC, Miller J, Lennhoff JD. Electrospun nanofiber reinforcement of gossamer space structures. *Nonwovens World* 2004; 13(1):46.

Pope JM, Sato T, Shoji E, Oyama N, White KC, Buttry DA. Organosulfur/conducting polymer composite cathodes II. Spectroscopic determination of the protonation and oxidations of 2,5-Dimercapto-1,3,4-thiadiazole. *Journal of the Electrochemical Society* 2002; 149(7):A939.

White KC, Buttry DA. An electrochemical and FTIR spectroscopic study of the aqueous oxidation of quadricyclane and noritricyclanol. *Journal of the Electrochemical Society* 2000; 147(1):266.

Presentations and Published Abstracts

White KC, Horn QC, Singh SK, Spray R. Thermal stability of lithium-ion cells as functions of chemistry, design and energy. Invited Presentation, International Battery Association Conference, Kona, HI, January 2010.

White KC, Horn QC. Evaluating performance, reliability and safety in lithium-ion battery cells. IEEE International Conference on Technologies for Practical Robot Applications, Waltham, MA December 2009.

Horn QC, White KC. Characterizing performance and determining reliability for batteries in medical device applications. ASM Materials and Processes for Medical Devices, Minneapolis, MN, August 13, 2009.

White KC, Horn QC. Lithium-ion cell overcharge in the absence of battery management unit failure. 214th Meeting of the Electrochemical Society, Honolulu, HI, October 2008; and 2008 Battery Power Conference, Dallas, TX, November 2008.

Myers TJ, White KC, Xu T. Did a dust explosion occur? Microscopic and thermogravimetric techniques to determine if dust participated in an explosion event. Proceedings, International Symposium on Fire Investigation Science and Technology, Cincinnati, OH, 2008; and Proceedings, Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2008.

Horn QC, White KC. Advances in characterization techniques for understanding degradation and failure modes in lithium-ion cells: Imaging of internal microshorts. Invited presentation, International Meeting on Lithium Batteries 14, Tianjin, China, June 27, 2008.

Horn QC, White KC. Novel imaging techniques for understanding degradation mechanisms in lithium-ion batteries. Presented at the Advanced Automotive Battery Conference, Tampa, FL, May 13, 2008.

Horn QC, White KC. Understanding lithium-ion degradation and failure mechanisms by cross-section analysis. 211th Electrochemical Society Meeting, Chicago, IL, Spring 2007.

White KC, Newman A, Boehme J, Middleton C, Pawle R, Middleton E, Lennhoff J, Horn QC, Shao-Horn Y. Anode and cathode templated three-dimensional lithium-ion batteries based on nano-fibrous electrodes. Invited presentation, 208th Electrochemical Society Meeting, Los Angeles, CA, Fall 2005.

White KC, Horn QC, Newman A, Salley EJ, Lennhoff JD. Lithium ion batteries based on polymer modified V₂O₅ cathode materials. Presented at the 206th Electrochemical Society Meeting, Honolulu, HI, October 2004.

White KC, Lennhoff JD, Salley EJ, Horn QC, Pasco-Gardner S, Racoveanu A. Advanced materials for battery applications. Invited Speaker, presented at the 8th Electrochemical Power Sources R&D Symposium, Portsmouth, VA, July 2003.

White KC, Horn QC, Salley E, Lennhoff JD. Three-dimensional cathode materials from electrospinning. Presented at the 204th Electrochemical Society Meeting, Orlando, FL, Fall 2003.

Horn QC, White KC, Shao-Horn Y, Lennhoff JD. Three dimensional lithium ion batteries based on non-woven carbon fabrics. Presented at the 204th Electrochemical Society Meeting, Orlando, FL, Fall 2003.

White KC, Salley EJ, Jayne K, Lennhoff JD. Application of electrospinning to the fabrication and reinforcement of gossamer space structures. Presented at the Annual Technical Conference of The Fiber Society, Natick, MA, October 2002.

White KC, Buttry DA, Torresi RM, Bruno R. Novel V₂O₅ composites for secondary lithium ion battery applications. Presented at the 196th Electrochemical Society Meeting, Honolulu, HI, October 1999.

White KC, Shouji E, Buttry DA. New approaches to lithium battery cathode material. Presented at the 50th Pittsburgh Conference, Orlando, FL, 1999.

White KC, Buttry DA, Torresi R, Torresi S. Sol-gel synthetic routes to novel lithium ion intercalation materials. Presented at the 217th national meeting of the American Chemical Society, Anaheim, CA, March 1999.

White KC, Buttry DA. Basic electrochemistry of some highly strained hydrocarbons. Presented at the 189th Meeting of the Electrochemical Society, Los Angeles, CA, May 1996.

Professional Affiliations

- Member of the Electrochemical Society, 1996–present
- Chair, New England Section of the Electrochemical Society, 2005–present