



Exponent[®]
Engineering & Scientific Consulting

Xin Chen, Ph.D.

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Professional Profile

Dr. Chen is a chemist with extensive knowledge and experience in various technological areas, including polymers and composites, lithium-ion batteries, heterogeneous catalysis and cementitious materials.

In particular, she has considerable industrial experience in formulation design of polymeric materials from ideation and lab-scale prototype development to manufacturing scale commercialization for products in applications including buildings and construction, transportation, consumer electronics, electrical and lighting components. She also has extensive hands-on experience with lithium-ion battery assembly, performance evaluation, and electrochemical characterization. Using her expertise in formulation-structure-property relationships, she routinely assists clients with product development and failure analysis investigations.

Prior to joining Exponent, Dr. Chen spent 10 years in industrial R&D roles at SABIC and Saint-Gobain CertainTeed, where she gained experience with both upstream polymeric raw material selection and formulation design, and downstream end-user product development. She is well versed in all stages of product development with polymeric materials for targeted applications. One of her core competencies is a solid understanding of the design principles of flame retardant polymer selection and formulation optimization through investigation of fundamental performance mechanisms and failure analysis. She is also knowledgeable in topics related to polymer durability, gained from her experience elucidating a polymer fade mechanism and investigating how the durability of the polymeric material is affected by polymer chemistry, chain structure, and formulation design especially around the selection of thermal and light stabilizers. She also has insight into the correlation between accelerated lab-scale weathering tests and outdoor real-time weathering scenarios. Furthermore, she explored cost-effective polymer recycling approaches to ensure process feasibility and product performance.

Dr. Chen is proficient in a variety of analytical techniques including molecular characterization by Fourier transform infrared (FTIR) spectroscopy, Raman spectroscopy, X-ray photoelectron spectroscopy (XPS), X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDX), thermal analysis techniques including thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), as well as mechanical characterization techniques including dynamic mechanical analysis (DMA) and rheological characterization. She also has extensive hands-on experience with standard mechanical (i.e., tensile, flexural and impact) and fire testing (i.e., fire resistance, flame spread, smoke density/toxicity) for polymer-based products. In addition, she has practice and knowledge in evolved gas analysis techniques, such as thermogravimetric analysis – mass spectrometry (TGA-MS) and pyrolysis gas chromatography – mass spectrometry (GC-MS).

As part of her graduate research experience, Dr. Chen studied the performance of organosilicon-based electrolyte in lithium-ion batteries as part of a joint effort between her academic institution and a start-up company, Silatronix. She investigated how electrochemical behavior at the electrolyte/electrode interface

over cycling controls the battery capacity and cycling stability. Through this work, she gained experience with electrochemical measurements including cyclic voltammetry (CV), electric impedance spectroscopy (EIS), and differential charge analysis. She also designed a system with in-situ thermal and electrochemical control coupled to a mass spectrometer (MS) to elucidate reactions at the electrolyte/electrode interface. Through her undergraduate research, she synthesized cerium-iron composite catalysts and investigated the relationship between catalyst structure and catalytic activity.

Academic Credentials & Professional Honors

Ph.D., Chemistry, University of Wisconsin, Madison, 2012

B.S., Chemistry, University of Science and Technology of China, 2007

Prior Experience

Senior Scientist, Saint-Gobain CertainTeed, 2017 - 2022

Senior Scientist, SABIC, 2016-2017

Scientist, SABIC, 2012 – 2016

Visiting Research Associate, Silatronix, Inc, June-September 2012

Patents

Xin Chen, Ajit Bhaskar, Theo Hoeks, Jan Henk Kamps, Wilson Cheung, "Nitrogen Containing Polymer Compositions Having Reduced Combustion Toxicity", WO2015/042560 A1

Monica Usrey, Xin Chen, Jose A Pena Hueso, Robert J. Hamers, Robert West, "Lithium-carbon monofluoride batteries with organosilicon electrolytes", US8486569 B2

Publications

Jinfeng Zhuge, Xin Chen, Anil KS, Drew P. Manica, "Microscale Combustion Calorimeter – Application and Limitation", Fire and Materials, 2016, DOI: 10.1002/fam.2358

Xin Chen, Monica Usrey, Adrian Peña-Hueso, Robert West, Robert J. Hamers, "Thermal and electrochemical stability of organosilicon electrolytes for lithium-ion batteries", Journal of Power Sources, 2013, 241, 311-319.

Lee Bishop, Joseph Yeager, Xin Chen, Jamie Wheeler, Marco Torelli, Michelle Benson, Steven Burke, Joel Pedersen, Robert Hamers, "A citric acid-derived ligand for modular functionalization of metal oxide surfaces via 'click' chemistry", Langmuir, 2012, 28, 1322-1329.

Huizhi Bao, Xin Chen, Jun Fang, Zhiqian Jiang, Weixin Huang, "Structure-activity relation of Fe₂O₃-CeO₂ composite catalysts in CO oxidation", Catalysis Letters, 2008, 125, 160-167.

Presentations

26th Annual Conference on Recent Advances in Flame Retardancy of Polymeric Materials, Stamford, CT, May 2015, "Thermal Decomposition and Flame Retardancy Mechanism of Polycarbonate-siloxane Copolymer" (Oral presentation)

UW Advanced Materials Industrial Consortium Annual Meeting, October 2011, "Real-time characterization of chemical changes at the interface of organosilicon electrolytes with electrodes for lithium-ion batteries"

(Poster presentation)

220th ECS Meeting & Electrochemical Energy Summit, Boston, MA, October 2011, "Real-time analysis of chemical changes at the interface of organosilicon electrolytes with graphitic anodes for lithium-ion batteries" (Oral presentation)

242nd ACS National Meeting, Denver, CO, August 2011, "Understanding organosilicon electrolyte / graphite electrode interface in lithium-ion battery" (Poster presentation)