



Exponent®

Engineering & Scientific Consulting

Min Zhang, Ph.D.

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Professional Profile

Trained as a materials scientist, Dr. Zhang specializes in multi-scale mechanical/structural analysis for a wide variety of polymer-related materials used in applications involving thin films, nanocomposites, adhesives, rubber/tires and personal care products. She has extensive experience with several surface and compositional characterization techniques, including: atomic force microscopy (AFM), scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-Ray photoelectron spectroscopy (XPS). In addition,

Dr. Zhang is highly skilled at characterizing the mechanical and thermal behavior of polymers and composite materials using techniques such as nanoindentation (NI), dynamic mechanical analysis (DMA), rheology, and differential scanning calorimetry (DSC).

Prior to joining Exponent, Dr. Zhang was a senior chemist in the Research & Innovation Division at L'Oréal. Her activities included advanced formulation development and support of global product launches through coordination of consumer needs and market trends combined with alignment to global strategic goals. She has considerable experience in key raw material identification and development of innovative and sustainable technologies for cosmetic applications in the pursuit of consumer-perceivable benefits.

Dr. Zhang's PhD research focused on localized mechanical property characterization of interphases in modeled and real polymer nanocomposite systems via both experimental and computational approaches. Her team developed an AFM-based technique for profiling both localized and quantitative mechanical properties for interphases between nanofillers and polymer matrices. The technique can be utilized to acquire various types of mechanical properties (elastic or viscoelastic) and applied in a wide range of polymer nanocomposite systems ranging from glassy polymers to soft rubbers.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Northwestern University, 2018

B.S., Wuhan University of Technology, 2013

B.S., Materials Science and Engineering, The Ohio State University, 2012

Licenses and Certifications

Quality Management Systems Auditor/Lead Auditor (ISO 13485:2016) CQI and IRCA Medical Devices

Prior Experience

Senior Chemist, L'Oréal, 2018-2019

Professional Affiliations

American Chemical Society (ACS)

Society of Cosmetic Chemists (SCC)

Publications

M. Zhang, S. Askar, J. Torkelson, C. Brinson. Stiffness Gradients in Glassy Polymer Model Nanocomposites: Comparisons of Quantitative Characterization by Fluorescence Spectroscopy and Atomic Force Microscopy. *Macromolecules*, 2017.

M. Zhang, Y. Li, P. Kolluru, C. Brinson. Determination of Mechanical Properties of Polymer Interphase Using Combined Atomic Force Microscope (AFM) Experiments and Finite Element Simulations. *Macromolecules*. 2018.

Xiaolin Li; M. Zhang, C. Brinson. Rethinking Interphase Representations for Modeling Viscoelastic Properties for Polymer Nanocomposites. *Materialia*, 2019.

Presentations

Exploring the confinement effect on the local mechanical properties of polymers in thin film systems, Society of Engineering Science, University of Maryland, College Park, MD, 2016.

Exploring the role of Interphase on Physical Properties of Modeled Nanocomposite, Fifth International Indentation Workshop, University of Texas at Dallas, 2015.

Direct Measurement of the Role of Confinement and Chemistry on Local Physical and Mechanical Properties of Polymers, Society of Engineering Science, Purdue University, West Lafayette, IN, 2014.

Additional Education & Training

Management for Scientists and Engineers Program, Management School of Kellogg, Northwestern University, 2016