

Exponent®
Engineering & Scientific Consulting

Lijie Yang, Ph.D.
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Professional Profile

Dr. Yang specializes in mechanical engineering analysis, solid mechanics, fluid and thermal engineering. She possesses extensive expertise in system design, custom laboratory-based testing, and failure analysis. Dr. Yang applies her skills to support clients across diverse industries, including consumer electronics, battery-powered micromobility, household appliances, home products, medical devices, clean energy, automotive components, cycling products, shipping containers, machine tools, heavy machinery, mechanical components such as fasteners, bearings and gears, and general manufacturing. Her work focuses on design and safety assessment, risk mitigation, and failure prevention. In addition to industrial consulting, Dr. Yang provides technical consulting services for litigation, arbitration, and insurance investigations involving intellectual property, product liability, trade secret disputes, and failures to meet contractual technical specifications.

Dr. Yang has studied the mechanical behavior of metals, ceramics, polymers, composites, and liquids. She is well-versed in a wide range of standardized mechanical testing methods and has developed numerous customized methodologies to evaluate products under foreseeable operational misuse. These customized approaches enable structural and material analysis at both micro and macro scales. Dr. Yang also integrates customized experimental testing into failure analysis to help clients thoroughly understand failure modes and enhance product design.

Dr. Yang has extensive cleanroom experience with photolithography, soft lithography, thin-film deposition, and etching, as well as a wide range of material and structural characterization techniques. Her expertise includes scanning electron microscopy with energy-dispersive spectroscopy (SEM/EDS), transmission electron microscopy (TEM), focused ion beam (FIB), dynamic mechanical analysis (DMA), thermomechanical analysis (TMA), atomic force microscopy (AFM), optical and coordinate metrology (OMM/CMM), nano-indentation, hardness and nano-scratch testing, magnetostriction analysis, thermal conductivity measurement, gas and liquid permeability testing, water vapor transmission rate (WVTR) measurement, mercury intrusion porosimetry (MIP) measurement, dynamic vapor sorption (DVS), and sedimentation analysis.

Prior to joining Exponent, Dr. Yang was a research assistant in the Micro/Nanoscale Thermal-Fluids Laboratory at Vanderbilt University, where she designed a collection of bioMEMS and microfluidic platforms to investigate cell mechanotransduction and electrophysiology, as well as organism behaviors. She developed a cutting-edge optoelectronic graphene transistor-based bioMEMS for probing neuronal electrical activities with ultrahigh spatiotemporal resolution using scanning photocurrent microscopy. Dr. Yang also studied biomechanics of cells through a novel automatic setup and mathematic modeling. In her master's program, she designed and built a high-pressure flash evaporator that allows operators to experimentally study a complex phase-change phenomenon, flash evaporation; Dr. Yang was granted a patent for the flash evaporator in 2012. She also gained extensive experience in finite element analysis (FEA) and computational fluid dynamics (CFD) with ANSYS, Fluent and COMSOL Multiphysics software during her graduate studies.

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Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Vanderbilt University, 2017

M.S., Mechanical Engineering, Harbin Engineering University, 2012

B.S., Mechanical Engineering, Harbin Engineering University, 2009

Vanderbilt University Graduate Student Scholarship

Outstanding Dissertation Award, 2009

Outstanding Graduate Award, 2009

National Scholarship, 2008

Licenses and Certifications

American Welding Society Certified Welding Inspector (CWI)

ASQ Certified Reliability Engineer (CRE)

Professional Affiliations

Affiliations

The American Society of Mechanical Engineers (ASME), Member, Committee E28 on Mechanical Testing

ASTM International, Member

Chinese Mechanical Engineering Society, Senior Member

Patents

China Patent ZL 2012 1 0011804.2: A High-Pressure Flash Evaporator, March 2014 (Yang L, Li Y, et al).

Publications

Tu Yu-Hui, Yang Li-Jie, Daniel Vasquez. novel insight into finite element modeling for failure analysis and engineering solution. The 19th China CAE Annual Conference, July 24th, 2023.

Wang R, Shi MJ, Brewer BM, Yang L, Zhang YC, Webb DJ, Li D, Xu YQ. Ultrasensitive graphene optoelectronic probes for recording electrical activities of individual synapses. Nano Letters. 2018; 18(9): 5702-5708.

Yang L, Carrington LJ, Erdogan B, Ao M, Brewer BM, Webb DJ, Li D. Biomechanics of cell reorientation in a three-dimensional matrix under compression. Experimental Cell Research 2017; 350(1):253-266.

Yang L, Hong T, Zhang Y, Arriola JGS, Nelms BL, Mu R, Li D. A microfluidic diode for sorting and immobilization of Caenorhabditis elegans. Biomedical Microdevices 2017; 19(2):38.

Ao M, Brewer BM, Yang L, Franco Coronel OE, Hayward SW, Webb DJ, Li D. Stretching fibroblasts remodels the extracellular matrix and alters cancer cell migration. Scientific Reports 2015; 5:8334.

Jean L, Yang L, Majumdar D, Gao Y, Shi M, Brewer BM, Li D, Webb DJ. The rho family GEF Asef2

regulates cell migration in three dimensional (3D) collagen matrices through myosin II. Cell Adhesion and Migration 2014; 8(5):460-467.

Brown JA, Sherrod SD, Goodwin CR, Brewer BM, Yang L, Garbett KA, Li D, McLean JA, Wikswo JP, Mirnics K. Metabolic consequences of interleukin-6 challenge in developing neurons and astroglia. Journal of Neuroinflammation 2014; 11(1):183.

Shao Y, Li Y, Yang L, Zhang X, Yang L, Wu H, Xu R. New experimental system for high pressure and high temperature flashing evaporation experiments. Applied Thermal Engineering 2014; 66 (1-2):148-155.

Quan C, Later K, Yang L, Peng S, Zhang A, Hao Q, Zhang J, Sun W, Yuan L, Peng GD. FBG application in monitoring the liquid-solid and gas-liquid phase transitions of water. Proceedings of SPIE, The 3rd Asia Pacific Optical Sensors Conference 2012.

Presentations

Yang L. Coating and thin film material characterization and failure analysis. The 7th Seminar on Materials and Processes for the Orthopaedics, Changzhou, Jiangsu China, September 2024.

Yang L. Medical Device Analysis and Regulatory Support. The 6th Seminar on Materials and Processes for the Orthopaedics, Changzhou, Jiangsu China, September 2023.

Yang L. Exploring the benefits of customized testing in failure analysis. Ninth International Conference on Engineering Failure Analysis (ICEFA), July 2022.

Yang L. Retrieval analysis and MRI safety assessment. The 5th Seminar on Materials and Processes for the Orthopaedics, Changzhou, Jiangsu China, July 2022.

Yang L. Safety in the MRI suite: considerations for medical devices and equipment. The 3rd Seminar on Materials and Processes for the Orthopaedics, Changzhou, Jiangsu China, September 2020.

Yang L, Carrington LJ, Wang L, Simaan N, Webb DJ, Li D. Cell response to static and cyclic compression in a three-dimensional matrix. EMI&PMC, Nashville, USA, May 2016.

Yang L, Carrington LJ, Webb DJ, Li D. Fibroblast reorientation in a three-dimensional matrix under compression. 5th ASME Micro/Nanoscale Heat & Mass Transfer International Conference, Singapore, Singapore, Jan 2016.

Yang L, Brewer BM, Ao M, Webb DJ, Li D. The effects of mechanical stress in normal tissue fibroblast activation and cancer associated fibroblast genesis. ASME 2014 International Mechanical Engineering Congress and Exposition, Montreal, Canada, November 2014.