

Exponent®
Engineering & Scientific Consulting

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Professional Profile

Dr. Brooke specializes in failure analysis, materials science, engineering mechanics, thin film coatings, system design, and the creation of testing apparatus. His degrees in mechanical engineering and materials science and engineering give him a broad experience base. With over 10 years of experience in failure analysis and consulting, he has assisted clients with issues related to food processing and storage, consumer electronics, medical devices including diagnostic, peripheral, and implanted devices. He has extensive knowledge of mechanical systems especially with a focus on materials including failure analysis of bearings, gears, and mechanical systems. He has worked in multidisciplinary teams for projects ranging from thin film coatings, high temperature reactions, batteries, MEMS, and optical structures, to fuel cell testing stations, building construction, and thermal regulation.

Prior to joining Exponent, Dr. Brooke was a graduate research assistant at the Georgia Institute of Technology, where he studied the deposition of functional thin film oxides on to complex 3D structures (including butterflies, inverse opals, and pollen) to create multifunctional assemblies for applications including active-passive displays and anti-counterfeiting. To facilitate this research, Dr. Brooke created multiple automated coating systems to deposit thin film coatings and also developed a novel high temperature (1000 □) reaction process to remove sulphur contamination from barium titanate samples. Dr. Brooke also conducted research on the use of thin film coatings in lithium ion battery cathodes as well as mechanical testing for structural materials used on the James Webb Space Telescope.

Academic Credentials & Professional Honors

M.S., Materials Science and Engineering, Georgia Institute of Technology, 2015

Ph.D., Materials Science and Engineering, Georgia Institute of Technology, 2015

B.S., Mechanical Engineering, University of North Florida, 2010

Licenses and Certifications

Professional Engineer Mechanical, California, #38815

Professional Engineer Metallurgical, California, #1993

Professional Engineer Metallurgical and Mechanical, Florida, #102282

Professional Engineer, Georgia, #PE045615

Professional Engineer, Michigan, #6201070141

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ASQ Certified Reliability Engineer

Professional Affiliations

ASM

ASME

Publications

Brooke P, Bennett-Kennett R, Gupta C, et al. Failure of coatings on wood substrates due to surface preparation and application. J Fail. Anal. and Preven 2024; 25:41–46.

Brooke P, Scales M, Guyer E, Fecke M. Metallurgical case studies of early-in-life failures in two water-tube boilers. J Fail. Anal. and Preven. 2022; 23:37–43.

Fang Y, Hester J, deGlee B, Tuan C, Brooke P, Le T, Wong CP, Tentzeris M, Sandhage K. A novel, facile, layer-by-layer substrate surface modification for the fabrication of all-inkjet-printed flexible electronic devices on Kapton. Journal of Materials Chemistry C 2016; 29.

Waller GH, Brooke PD, Rainwater BH, Lai SY, Hu R, Ding Y, Alamgir FM, Sandhage KH, Liu ML. Structure and surface chemistry of Al2O3 coated LiMn2O4 nanostructured electrodes with improved lifetime. Journal of Power Sources 2015; 306:162–170.

Presentations

Bennett-Kennett R, Semenikhin N, Brooke P, Schoen D, Guyer E. Corrosion mitigation in actuator design. AMPP 2026, Houston, TX, 2026.

Lemberg J, Brooke P. Slab impulse response testing as a method of determining the cause of SCC in a newly installed false tank bottom: a technical case study. Failure Analysis Society Summit on Failure Analysis & Prevention: Fatigue and Fracture, Oceanside, CA, 2026.

Semenikhin N, Brooke P, Bennett-Kennett R, Lemberg J. A comparative analysis of corrosion product removal methods for ferrous fracture surfaces. IMAT 2025, Detroit, MI, 2025.

Semenikhin N, Brooke P, Bennett-Kennett R, Lemberg J, Dodaran M, Molnar J. Abnormal failures of table knives during operation. IMAT 2025, Detroit, MI, 2025.

Russell T, Brooke P, Swanger L. Identifying facts from failure in forensic bearing investigations. 2025 STLE Annual Meeting, Atlanta, GA, 2025.

Brooke P, Semenikhin N, Bennett-Kennett R, Guyer E. Pitfalls of using EDS in failure analysis. international materials, Applications & Technologies Conference 2024, Cleveland, OH, 2024.

Issahaq MN, Strayer AR, Brooke PD, Lemberg JA, Guyer EP. Muzzleloader failure Analysis. 15th International Conference on Fracture, Atlanta, Georgia, 2023.

Brooke P, Lemberg J, Guyer E, Fecke M. Metallurgical case studies of early-in-life failures in three watertube boilers. International Materials, Applications & Technologies Conference 2022, New Orleans, LA, 2022.

Brooke PD, Sandhage K. Multimodal coloration: replication of structurally colored biological templates with photoluminescent materials. MSE Graduate Poster Competition, Atlanta, GA, 2015.

Brooke PD, Goodwin WB, Shin D, Meredith JC, Sandhage KH. Control of Ba, Ti and Sr content for syntheses of phase pure ferroelectric BaTiO3 and BaxSr1-xTiO3 pollen replicas for tailorable electrostatic adhesion. Bio-PAINTS MURI Review Meeting, Atlanta, GA, 2015.

Brooke PD, Goodwin WB, Zhang Y, Sandhage KH. Shape and size-preserving oxide replication of butterfly scales. BIO-OPTICS MURI Annual Review, Boston, MA, 2014.