

Exponent®
Engineering & Scientific Consulting

Paul Verghese, Ph.D., P.E., CRE

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Professional Profile

Dr. Verghese specializes in materials engineering, and is experienced at failure analysis, product development, reliability engineering, material characterization, and materials selection. He has investigated materials issues in a number of industrial, building, and consumer product areas.

These investigations included glass articles (containers, windows/glazing, guard rails, electronic displays, tables/shelves, laminated glass, toughened glass), consumer electronics, consumer appliances, active and passive medical devices and implants, semiconductor devices, fiber optic subsystems and components, electric power infrastructure, building materials, and fittings and fasteners.

Key areas of investigation include fracture of glass, ceramics, semiconductors, metals, and polymers; delamination and debonding; corrosion, fatigue, and environmentally assisted cracking; fretting and wear; contaminant analysis; failures of adhesives and seals; electronic material failures (varistors, integrated circuit chips, printed circuit boards, solder joints, metallic whiskers); thin film and coating failures (anodization, inks, paints, dielectrics, oleophobic and hydrophobic coatings); cosmetic defects; and materials-based design reviews.

Dr. Verghese has prior industry experience in product development, manufacturing, and quality and reliability of microelectromechanical systems (MEMS), high frequency microelectronics, and fiber optic components and systems. Before joining Exponent, Dr. Verghese was a reliability engineer in the Semiconductor Products Group at Agilent Technologies, Inc., and a product development engineer at Axsun Technologies, Inc. At Agilent, he was responsible for reliability assessment and qualification of high volume RF devices. At Axsun, he led a MEMS device team and developed test capabilities, packaging processes, and yield improvements for a fiber optic spectrometer. Dr. Verghese has also taught “Introduction to Materials” in the College of Engineering at San Jose State University.

Academic Credentials & Professional Honors

Ph.D., Materials Science, University of California, Santa Barbara, 1999

B.S., Materials Science and Engineering, North Carolina State University, 1991

Licenses and Certifications

ASQ Certified Reliability Engineer (CRE)

Patents

US Patent 7,420,738: Dual Membrane Single Cavity Fabry-Perot MEMS Filter, September 2008 (Verghese P).

Publications

Verghese P, Lindahl P, Kytömaa H, Little M. Glass Analysis in a Metal Halide Lamp Warehouse Fire Investigation. Proceedings, 10th International Symposium on Fire Investigation Science and Technology, Orlando, FL, September 16-18, 2024.

Verghese PM, Budiansky ND, Ledwith P, Bauer D. Residue Induced Product Failures - Microanalysis. Microscopy and Microanalysis 2016;22(S3): 1730-1731.

Wodin-Schwartz S, Verghese P, Bove R, Kennedy E. Falling body impact behavior of fiberglass stepladders with plastic knee braces. Proceedings, ASME 2015 International Mechanical Engineering Congress and Exposition IMECE2015, Houston, TX, November 13-19, 2015.

Marr KC, Verghese PM, Braff WA, Morse T. Analysis of arc erosion on thermal switch contacts. Proceedings, 7th International Symposium on Fire Investigation Science and Technology, College Park, MD, September 22-24, 2014.

Dugnani R, Zednik RJ, Verghese P. Analytical model of dynamic crack evolution in tempered and strengthened glass plates. International Journal of Fracture 2014; 190(1-2):75-86.

Dugnani R, Verghese P. Failure analysis of modern silicon dice. International Journal of Applied Ceramic Technology 2014; 11(4):783-792.

Guyer EP, Eiselstein L, Verghese P. Accelerated testing of active implantable medical devices. Paper No. 09464, Corrosion 2009, NACE International, Atlanta, GA, 2009.

Verghese P, Clarke DR. Piezoelectric contributions to the electrical behavior of ZnO varistors. Journal of Applied Physics 2000; 87(9):4430-4438.

Verghese P, Clarke DR. Surface textured zinc oxide films. Journal of Materials Research 1999; 14(3):1039-1045.

Tavernier PR, Verghese P, Clarke DR. Photoluminescence from laser assisted debonded epitaxial GaN and ZnO films. Applied Physics Letters 1999; 74:18:2678-2680.

Selected Presentations

Verghese, PM, Wong, M. Process-Structure Optimization of Dental Implant Surfaces during Manufacturing Process Development. Innovations in Biomedical Materials 2016 (American Ceramic Society), Chicago, IL, 2016.

Verghese P, Marr KC, Trenkle JC, Somandepalli V. The secret to engineering good products: failure analysis and forensics. American Society of Mechanical Engineers, Natick, MA, 2015.

Budiansky N, Trenkle JC, Verghese P. Evaluating the role of thread compounds in brass stress corrosion cracking. Materials Science & Technology (MS&T), Pittsburgh, PA, 2014.

Trenkle JC, Budiansky N, Verghese P. Detection and analysis of sub-surface corrosion by computed X-ray tomography (CT). Materials Science & Technology (MS&T), Pittsburgh, PA, 2014.

Verghese P, Dugnani R. Fractography of high strength silicon. Materials Science & Technology (MS&T),

Montreal, QC, 2013.

Budiansky N, Trenkle JC, Verghese P. The failure of brass gas line fittings: cause or consequence of fire. Materials Science & Technology (MS&T), Montreal, QC, 2013.

Verghese P, Carlo S, Wu M. Consumer product surface modification and analysis. 238th National Meeting of the American Chemical Society (ACS), Washington, DC, 2009.