



**Exponent<sup>®</sup>**

Engineering & Scientific Consulting

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## Professional Profile

Dr. Guyer holds academic degrees in Chemical Engineering as well as Materials Science & Engineering and is a licensed Professional Engineer in both Mechanical Engineering and Metallurgy. In addition, he is also a NACE Certified Coatings Inspector.

Accordingly, with his breadth of training and expertise, Dr. Guyer assists clients in solving complex multidisciplinary problems across a wide variety of industries.

Over the last 17 years at Exponent, he has carried out many hundreds of failure analysis investigations and product evaluations of complex engineering structures and chemical processes. Some examples include the automotive space wherein he has investigated mechanical performance of metal, plastic and glass structures, evaluated coating degradation and corrosion, and also explored issues and performance of diesel exhaust after treatment systems (EATS) components like SCR catalysts, DPF's, AFI's, and so on.

In the medical device space, Dr. Guyer has investigated performance of a variety of devices including orthopedics, cardiovascular, active implantables and drug delivery systems to name a few. Dr. Guyer has examined a range of consumer product performance issues including fractures, water ingress, over-heating events and explosions (including from various types of rifles and pistols). Relative to industrial systems, he has extensive experience with low-e coatings, boiler welds and tubing fractures, turbine coatings, as well as issues associated with a variety of other pressure vessels and plumbing components. Finally, with respect to paint and protective-coating systems; he has developed coating specifications and conducted a myriad of failure analysis investigations into delamination, cracking, blistering, chalking, discoloration, mildew and efflorescence.

In general, these investigations are typically related to root-cause analyses. As a result of Dr. Guyer's extensive research into how and why devices or structures can fail, he also consults on the design as well as risk and hazard assessments of new products.

Dr. Guyer previously held two academic appointments: one in the Materials Science and Engineering Department at Stanford University where he taught the course Failure Analysis of Emerging Technologies and the other in the Mechanical Engineering Department at Santa Clara University where he taught the course Fracture and Fatigue of Materials.

Prior to joining Exponent, Dr. Guyer was employed as a Senior Materials Engineer at Lockheed Martin's Advanced Technology Center. His research involved the oxidation kinetics of advanced high temperature ceramics as well as the fracture, mechanical and optical properties of polymer thin-films. As an undergraduate, Dr. Guyer was employed by the Dow Chemical Corporation where he examined the mechanisms of controlled drug delivery in biodegradable, pharmaceutical grade polymers.

## Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Stanford University, 2005

M.S., Materials Science and Engineering, Stanford University, 2003

B.S., Chemical Engineering, Iowa State University, 2000

Electrochemical Society (ECS), San Francisco Section, Section Officer, 2006-2007

Intel Foundation Fellowship, 2004

ECS, Dr. Daniel Cubicciotti Award, 2004

Omega Chi Epsilon, Chemical Engineering Honor Society

## Licenses and Certifications

NACE - Certified Coating Inspector Level 1 Certification

## Academic Appointments

Lecturer, Stanford University, Department of Materials Science and Engineering

Adjunct Lecturer, Santa Clara University, Department of Mechanical Engineering

## Professional Affiliations

The Society for Protective Coatings—SSPC

National Association of Corrosion Engineers—NACE

American Society for Metals—ASM

## Publications

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.

Kinsey AH, Lemberg JA, Dyer MS, Guyer EP. Welding Complications Caused by Steel Casting Defects: Why Process Control and Product Quality Are Critical for Customers. MS&T2018, Columbus, OH, 2018.

Lemberg J, Guyer E, Seidel S, Garry M, Tsuji J, Valenty S. Utilizing a combination of TGA and GC-MS to estimate health-based risks from off-gassed volatile compounds. Materials Science & Technology (MS&T) 14th Annual Conference, Columbus, OH, October 2018.

Lemberg, J, Guyer, E, Seidel, S, Garry, M, Tsuji, J, Valenty, S. Utilizing a combination of TGA and GC-MS to estimate health-based risks from off-gassed volatile compounds. Journal of Failure Analysis and Prevention 2018; 18(2): 246-249.

Lemberg JA, Ellis BD, Guyer EP. Failure of a trunnion axle on a hard suspension multi-axle trailer.

Journal of Failure Analysis and Prevention 2017; 17(2): 189-194.

Dyer MS, Guyer EP. Plumbing hardware failure analyses. Journal of Failure Analysis and Prevention 2017 Feb; 127(1):23-29. doi:10.1007/s11668-016-0211-1

Arnholt CM, MacDonald DW, Underwood RJ, Guyer EP, Rimnac CM, Kurtz SM, and the Implant Research Center Writing Committee. Do stem taper microgrooves influence taper corrosion in total hip arthroplasty? A matched cohort retrieval study. J Arthroplasty, Published Online, 2016.

Lemberg J, Guyer E. Failure of a trunnion axle on a hard-suspension, multi-axle trailer. Presentation, Materials Science & Technology Meeting and Exhibition, Salt Lake City, UT, October 23-27, 2016.

Crane C, Guyer E. Painting Aluminum: Easier said than done. Presentation, Materials Science & Technology Meeting and Exhibition, Salt Lake City, UT, October 23-27, 2016.

Beckham H, Guyer E. Testing in the context of litigation. Georgia Defense Lawyer, Winter 2016.

Guyer E, Lemberg J. Things break... the hard part is figuring out why! The NCADA Resource, 2015.

Guyer E, Kupkovits, R. Failure analysis of an HVAC flex hose connector. Proceedings, MS&T14, Pittsburgh, PA, October 15, 2014.

Lemberg J, Guyer E, Eiselstein L. Possible microbiologically induced corrosion (MIC) of stainless steel weld used in domestic water risers. Proceedings, MS&T 2014, Pittsburgh, PA, October 12-16, 2014.

Guyer E. Adhesion basics: Stress, strength and structure. NACE Eastern Area Conference, Myrtle Beach, SC, October 6-8, 2014.

Guyer E, Yaun T, Moore N. The challenges of international product liability losses. Atlanta CPCU I-day conference The Global Insurance Market: A World of Opportunity, Atlanta, GA, February 24, 2014.

James B, Guyer E, Hudgins A, Lieberman S, Kane W. Analysis of surgical tool failures: Causes and prevention. Materials Science & Technology 2014, Pittsburgh, PA, October 12-16, 2014.

Guyer EP, Pound B, Crane S. Corrosion of an implanted medical device: Rare-earth magnet case study. Microscopy and Microanalysis 2013 Aug; 19(S2):1834-1835.

Guyer EP, James BA. Surgical tool failure analyses. Journal of Failure Analysis and Prevention 2013; 13(6).

Guyer EP, Pound B, Crane S. Corrosion of an implanted medical device: Rare-earth magnet case study. Microscopy and Microanalysis 2013; 19(S2):1834-1835.

Guyer EP, Pound B, Crane S. (Invited) Corrosion of an implanted medical device: Rare-earth magnet case study. Microscopy and Microstructure Analysis, August 5-8, 2013.

James B, Guyer E, Hudgins A, Lieberman S, Kane W. Analysis of surgical tool failures: Causes and prevention. Materials Science and Technology, Montreal, Quebec, Canada, 2013.

Han SM Han, Guyer EP, Nix WD. Extracting thin film hardness of extremely compliant films on stiff substrates. Thin Solid Films 2011; 519:3221-3224.

Guyer EP, Pan Z. Specialty inorganic materials: Advances in metals and ceramics. Medical Design & Manufacturing West, Anaheim, CA, February 2011.

James BA, McVeigh C, Rosenbloom SN, Guyer EP, Lieberman SI. Ultrasonic cleaning-induced failures in

medical devices. Journal of Failure Analysis and Prevention 2010; 10(3):223-227.

Guyer EP, Zednik R. Sterile barriers for medical devices: Failure modes and mitigation. Plastics Engineering 2010; 66(9):26-31, October.

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Guyer EP, Lane M. Improving the reliability of medical device coatings, Medical Device Materials V, the Materials and Processes for Medical Devices Conference, Minneapolis MN, August 10-12, 2009.

Guyer EP, Eiselstein L, Verghese P. Accelerated testing of active implantable medical devices, Corrosion 2009, NACE International, Atlanta, GA, 2009.

Guyer EP, Zednik RJ. Sterile barriers for medical devices: Failure modes and mitigation. Proceedings, ANTEC 2010, Society of Plastics Engineers, Vol. II, pp. 1925-1927, Orlando, FL, May 2010. Guyer EP, Eiselstein L, Verghese P. Accelerated testing of active implantable medical devices. Paper No. 09464, Corrosion 2009, NACE International, Atlanta, GA, 2009.

Guyer EP, Lane M. Improving the reliability of medical device coatings. Proceedings, Medical Device Materials V, the Materials and Processes for Medical Devices Conference, 2009, pp. 35-40, Minneapolis MN, August 10-12, 2009.

James BA, McVeigh C, Rosenbloom SN, Guyer EP, Lieberman SI. Ultrasonic cleaning-induced failures in medical devices. Proceedings, Medical Device Materials V, the Materials and Processes for Medical Devices Conference, 2009, pp. 10-12, Minneapolis MN, August 10-12, 2009.

Baldwin JM, Bauer DR, Rehkopf JD, Guyer EP, Ledwith P. Degradation of VMQ silicones in engine sealing applications. Presented at the 173rd Technical Meeting of the ACS Rubber Division, Dearborn, MI, April 2008.

Houle FA, Guyer EP, Miller DC, Dauskardt RH. Adhesion between template materials and UV-cured nanoimprint resists. Journal of Vacuum Science & Technology B 2007 July/Aug; 25(4).

Joseph R, Guyer EP, Thelen R. Tired of watching paint dry? Metal Finishing Magazine 2007; April.

Guyer EP, Gantz J, Dauskardt RH. Aqueous solutions diffusion in hydrophobic nanoporous thin-film glasses. Journal of Materials Research 2007; 22, 2007.

Houle FA, Miller DC, Guyer EP, Dauskardt EP, Rice E, Hamilton J. Adhesion between template materials and UV-cured nanoimprint resists. Proceedings, SPIE, Vol. 6153, 2006.

Gage D, Guyer EP, Stebbins J, Cui Z, Al-Bayati A, Demos A, MacWilliams K, Dauskardt RH. UV curing effects on glass structure and mechanical properties of organosilicate Low-k thin films. Proceedings, 9th Annual IEEE International Interconnect Technology Conference, Burlingame, CA, June 2006.

Guyer EP, Patz M, Dauskardt RH. Fracture of nanoporous methylsilsesquioxane thin-film glasses. Journal of Materials Research 2006; 21(4).

Iacopi F, Travaly Y, Eyckens B, Waldfried C, Abell T, Guyer EP, Gage DM, Dauskardt RH, Sajavaara T, Houthoofd K, Grobet P, Jacobs P, Maex K. Short-ranged structural rearrangement and enhancement of mechanical properties of organosilicate glasses induced by ultraviolet radiation. Journal of Applied Physics 2006; 99.

Guyer EP. Adhesion of thin-films. Medical Device Task Force, Tempe, AZ, November 2006.

Guyer EP. Environmentally assisted crack growth in thin-films. Medical Device Task Force, Tempe, AZ, November 2006.

Guyer EP, Dauskardt RH. Effect of solution pH on subcritical crack growth in Low-k dielectric thin-films. Journal of Materials Research 2005; 20(3):680-687.

Guyer EP, Dauskardt RH. Effect of porosity on reducing cohesive strength and accelerating crack growth in Ultra Low-k thin-films. Proceedings, 8th Annual IEEE International Interconnect Technology Conference, Burlingame, CA, June 2005.

Dauskardt RH, Guyer EP. Accelerated debonding and cracking in thin-film structures: Chemical reaction rate and loading effects. Proceedings, 11th International Conference of Fracture, Turin, Italy, March 2005.

Guyer EP, Dauskardt RH. Electrical technique for monitoring crack growth in thin-film fracture mechanics specimens. Journal of Materials Research 2004; 19(11):3139-3144

Guyer EP, Dauskardt RH. Fracture of nanoporous thin-film glasses. Nature Materials 2004; 3(1):53-55

Guyer EP. The effects of aqueous solution chemistry on the fracture of nanoporous thin-films. Ph.D. Dissertation, Leland Stanford Junior University, Stanford, CA, 158 pp., 2004.

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Guyer EP, Dauskardt RH. Accelerated crack growth of nanoporous Low-k glasses in CMP slurry environments. Proceedings, 7th IEEE International Interconnect Technology Conference, Burlingame, CA, June 2004.

Guyer EP, Dauskardt RH. Effect of aqueous solution chemistry on the accelerated cracking of lithographically patterned arrays of copper and nanoporous thin-films. Proceedings, Spring Materials Research Society Conference, Symposium F, San Francisco, CA, April 2004.

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