

Roberto Dugnani, Ph.D., P.E.
Senior Managing Engineer

Professional Profile

Dr. Roberto Dugnani is a Senior Managing Engineer in Exponent's Mechanical Engineering practice. Dr. Dugnani specializes in mechanical engineering and mechanics, with particular interest in consumer products, analysis of the mechanical failure of silicon chips, chemical strengthening of glasses, optical properties of glass, bio-medical devices, composites, and structural health monitoring. His experience includes design of bio-medical devices, manufacture of piezoelectric sensors for biomedical applications, and development of damage detection diagnostics on plate-like and fuselage structures. Dr. Dugnani has also trained in patent examination, and assists clients with intellectual property issues. Dr. Dugnani is also a member of the adjunct faculty in the Department of Civil Engineering at Santa Clara University, where he lectures on the topic of Statics and Mechanics of Materials.

Prior to joining Exponent, Dr. Dugnani worked at the National Institute of Advanced Industrial Science and Technology (AIST) in Tsukuba, Japan, contributing to the development and manufacture of novel MEMS devices for biomedical applications. He also worked as a Project Engineer at Parkinson Machinery & Manufacturing, where he designed, drafted, and oversaw the manufacture of industrial size winder and web handler prototypes for an international market.

Academic Credentials and Professional Honors

Ph.D., Aeronautics and Astronautics, Stanford, 2003

M.S., Mechanical Engineering, Worcester Polytechnic Institute, 1997

B.S., Mechanical Engineering, Worcester Polytechnic Institute (*high distinction*), 1995

Registered Professional Mechanical Engineer, California, #M33391

Relevant Courses

Failure Analysis for Medical Device Engineer, ASM Seminar, Sunnyvale, March 2006

The PLI Patent Bar Review for the USPTO Patent Agent Examination, Practicing Law Institute, Costa Mesa, CA, June 2005

Books

Dugnani R. Impedance-based Diagnostic Devices: Designing a 'Smart' Angioplasty Balloon and Other Novel Diagnostic Medical Devices. Published by VTM Verlag Dr. Müller, January 23, 2009.

Journal Articles

Dugnani R. Dynamic behavior of structure-mounted disk-shape piezoelectric sensors including the adhesive layer. *J Intell Mat Sys Struct* 2008; December.

Dugnani R. Health monitoring of in-service composite structures. Proceedings 2nd Asia-Pacific Workshop on Structural Health Monitoring, Melbourne, Australia, December 2008.

Dugnani R. A modified global-local analysis model of a PZT disk transducer bonded to a host structure. Proceedings, 6th International Workshop on Structural Health Monitoring, Stanford University, CA, September 2007.

Dugnani R, Chang FK. In vitro atherosclerotic plaque characterization by acoustic impedance monitoring. Part I: Sensor modeling, design, and fabrication. *J Intell Mat Sys Struct* 2008; 19(7):815–826.

Dugnani R, Chang FK. In vitro atherosclerotic plaque characterization by acoustic impedance monitoring Part II: Experimentation and validation. *J Intell Mat Sys Struct* 2007; 19:827–835, November.

Iijima T, Ito S, Matsuda H, Dugnani R, Chang FK. Ferroelectric and piezoelectric properties of disk shape lead zirconate titanate thick films. *Mater Trans* 2004; 45(2):233–235.

Dugnani R, Malking M. Impact and damage detection on a large composite structure. Proceedings, 4th International Workshop on Structural Health Monitoring, pp. 301–309, September 2003.

Iijima T, Matsuda H, Ito S, Dugnani R, Chang FK. Micro-fabrication of disk shape lead zirconate titanate thick films and its ferroelectric and piezoelectric properties. Proceedings, Japan International SAMPE Symposium, Vol. 1, pp. 197–200, 2003.

Dugnani R, Chang FK. A novel impedance-based sensor technique for real time, in vivo, unstable plaque characterization. Proceedings, 1st European Workshop on Structural Health Monitoring, 2002.

Hermanson JC, Dugnani R, Johari H. Structure and flame length of fully-modulated, pulsed diffusion flames. *Combust Sci Technol* 2000; 155:203–225.

Hermanson JC, Dugnani R, Johari H. Length of fully-modulated diffusion flames. *Chem Phys Processes in Combust* 1997; 349–352.

Presentations

Dugnani R. A modified global-local analysis model of a PZT disk transducer bonded to a host structure. 6th International Workshop on Structural Health Monitoring, Stanford University, CA, September 2007.

Dugnani R. Electrical properties of 10 μ m-thick PZT films prepared by chemical solution deposition process. 11th US-Japan Seminar on Dielectric & Piezoelectric Ceramics, Sapporo, Japan, 2003.

Dugnani R. Preparation of disk shape 11- μ m-thick lead-zirconate-titanate films and their ferroelectric and piezoelectric properties. 3rd International Workshop on Micro-Machined Ultrasonic Transducer, Lausanne, Switzerland, 2003.

Dugnani R. A novel impedance-based sensor technique for real time, in vivo, unstable plaque characterization. 1st European Workshop on Structural Health Monitoring, Paris, France, 2002.

Dugnani R. Structure and flame length of fully-modulated, pulsed, diffusion flames. AIAA 36th Aerospace Sciences Meeting and Exhibit, Reno, NV, 1998.

Dugnani R. Flame length of pulsed diffusion flames. American Physical Society, Division of Fluid Dynamics Meeting, Syracuse, NY, 1996.

Dugnani R. Design of a heat-shield for solar probe. AIAA North East Student Conference, New York, NY, 1995.