

Steven Crane, Ph.D., P.E.
Senior Engineer

Professional Profile

Dr. Steven Crane is a Senior Engineer in Exponent's Materials and Corrosion Engineering practice. Dr. Crane's areas of expertise include functional oxides, magnetic materials, composite ceramics, thin film structures, and laser-material interactions. He is also knowledgeable in the deposition and processing techniques required for electronic component fabrication, including ceramic powder processing, tape casting, rf- and dc-sputtering, plasma dynamics, ion implantation and milling, chemical vapor deposition, rapid thermal processing, chemical mechanical polishing, photolithography, and wet and dry etching processes. He also has a strong background in semiconductors, electrical characterization, and nanotechnology, in addition to an extensive knowledge of general materials science, including ceramics, metals, polymers, and glasses.

Dr. Crane has experience in the gas pipeline industry, including a year-long effort to assist a large gas utility company with the implementation of a plan to validate the Maximum Allowable Operating Pressure (MAOP) for its gas transmission lines. Tasks included managing staff to search and organize 1.5M records relating to pipeline installation and repair and the development of pipeline features lists (PFLs) and QC methods for ensuring quality.

Dr. Crane has experience with consumer product and electronics failure analysis and forced failure testing, as well as protective coatings and medical devices. He has been involved in failure analysis investigations of piping systems, power transmission lines, electroless nickel coatings, and UV degradation of pigments, adhesives, and coatings.

Prior to joining Exponent, Dr. Crane completed his Ph.D. in Materials Science and Engineering at the University of California, Berkeley. His research focused on the synthesis and electrical characterization of oxide thin films, specifically investigating the interplay between electric polarization and magnetization in nanostructured composite materials, which required expertise in ionic diffusion and non-equilibrium thermodynamics. In this work, Dr. Crane also developed experience in scanning probe microscopy, resonance spectroscopy, single-crystal x-ray diffraction, and ion beam processing. He also has experience performing quality control in a nuclear materials production facility and has developed material testing equipment for thermal barrier coatings used in military aircraft engines.

Academic Credentials and Professional Honors

Ph.D., Materials Science and Engineering, University of California, Berkeley, 2009

M.S., Materials Science and Engineering, University of California, Berkeley, 2007

B.S., Materials Science and Engineering, University of Florida (*summa cum laude*), 2004

NSF Graduate Research Fellow, 2004–2007; UF MSE Department Scholar, 2004; Dow Chemical Scholar, 2003; R. David Adamson Scholar, 2002; Florida Bright Futures Scholar, 2000–2004

Current Licenses and Certifications

Licensed Professional Electrical Engineer, California, #E19898

Publications

Benatmane N, Crane SP, Zavaliche F, Ramesh R, Clinton CW. Voltage-dependent ferromagnetic resonance in epitaxial multiferroic nanocomposites. *Applied Physics Letters* 2010; 96:082503.

Crane SP, Bihler C, Gajek M, Goennenwein STB, Brandt MS, Ramesh R. Tuning magnetic properties of magnetoelectric BiFeO₃-NiFe₂O₄ nanostructures. *Journal of Magnetism and Magnetic Materials* 2008; 321(4):L5-L9.

Martin L, Crane SP, et al. Multiferroics and magnetoelectrics: Thin films and nanostructures. *Journal of Physics: Condensed Matter* 2008; 20:434220.

Zhan Q, Crane SP, et al. Microstructure of multiferroic BiFeO₃-NiFe₂O₄ films. *Journal of Applied Physics* 2006; 89:172902.

Presentations

Crane SP. Magnetoelectric coupling and magnetic anisotropy in nanostructured oxide thin films. Materials Research Society Fall Meeting, Boston, MA, 2008.

Crane SP. Leakage mechanisms and ferromagnetic resonance analyses in thin-film multifunctional BiFeO₃-NiFe₂O₄ nanostructures. Materials Research Society Fall Meeting, Boston, MA, 2007.

Crane SP. Thin-film multiferroic BiFeO₃-NiFe₂O₄ nanostructures. Materials Research Society Fall Meeting, Boston, MA, 2005.

Crane SP. Magnetic properties of NiFe₂O₄ nanostructures. Magnetism and Magnetic Materials Fall Meeting, San Jose, CA, 2005.

Prior Experience

Intern, GE Global Nuclear Fuels, Wilmington, NC, 2004

Intern, GE Aircraft Engines, Cincinnati, OH, 2003

Peer Reviewer

IEEE Transactions on Magnetics
Journal of Magnetism and Magnetic Materials
Journal of Materials Science
Physica B

Professional Affiliations

Materials Research Society—MRS
ASM International