

Dielectric and Ferroelectric Analysis of Nanoparticle/Nanocrystalline Barium Titanate and PLZT for use in Smart Inorganic Materials Systems

C. B. DiAntonio*, T. Monson, M. R. Winter, T. P. Chavez, and P. Yang, Sandia National Laboratories, Albuquerque, NM, 87185, USA.

Attractive for numerous technological applications, ferroelectronic oxides constitute an important class of multifunctional compounds. Intense experimental efforts have been made recently in synthesizing, processing and understanding ferroelectric nanostructures. An objective being to optimize and implement the active functions of these materials into 'smart' devices that elicit the appropriately designed response. This work will present the systematic characterization and optimization of barium titanate and lead lanthanum zirconate titanate nanoparticle based ceramics and how these materials are being examined to meet needs for present and future applications. The nanoparticles have been synthesized using several solution and pH-based synthesis processing routes and employed to fabricate polycrystalline ceramic and nanocomposite based components. The dielectric and ferroelectric properties of these various components have been gauged by impedance analysis and electromechanical response and will be discussed.

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S.

Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.