SAND2013-10397C

Field Assisted Sintering of Functional Nanoparticle Oxide Ceramics for Nanocrystalline Bulk Materials

Christopher B. DiAntonio, Tom Chavez, and Todd Monson,
Sandia National Laboratories, Albuquerque, New Mexico, USA

Yiquan Wu
New York State College of Ceramics, Alfred University
Alfred, NY, USA

Nanocrystalline bulk materials are desirable for many applications as they can result in combinations of unique macroscopic properties. The growing demand for nanocrystalline materials is driven by applications which make use of very specific mechanical, electrical, magnetic, or optical properties of the nanomaterial. In order to achieve this, nanoparticle powders need to be synthesized and consolidated in a way that preserves the specific nanofeatures of the microstructure. The combination of the high sinterability of nanocrystalline powders with the rapid densification rates characteristic of field assisted sintering has been promoted as a method for fabricating nanoscale polycrystalline oxides. This presentation will report on research designed to understand the fundamentals of grain growth and densification by investigating the sintering behaviors and microstructures of nanoparticle barium titanate, lead zirconate titanate (PZT), and a nickel zinc copper ferrite ceramic by use of the field assisted sintering method. The primary objective is to sinter these materials to high density while maintaining a nanoscale microstructure through manipulation of the sintering parameters such as heating rate, sintering temperature, dwelling time and applied pressure.

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.

International Conference on Sintering 2014
August 24-28, 2013
Dresden, Germany

Yiquan Wu, Ph.D.
Assistant Professor of Materials Science and Engineering
Kazuo Inamori School of Engineering
New York State College of Ceramics, Alfred University
2 Pine Street, Alfred, NY 14802-1296, USA
Tel: 607-871-2662; Fax: 607-871-2354; Email: wuy@alfred.edu