

DENSE DIELECTRIC CERAMICS WITH LOCAL GRADED STRUCTURE FROM CORE-SHELL PARTICLES: PREPARATION AND PROPERTIES

M.T. BUSCAGLIA¹, M. VIVIANI¹, Z. ZHAO², V. BUSCAGLIA¹, L. MITOSERIU^{3,4}, P. NANNI⁴

¹Inst. of Energetics and Interphases, National Research Council, Genoa, Italy.

²Dept. of Inorganic Chemistry, Stockholm University, Stockholm, Sweden.

³Dept. of Solid State and Theoretical Physics, "Al. I. Cuza" University, Iasi, Romania.

⁴Dept. of Process and Chemical Engineering, University of Genoa, Genoa, Italy.

mt.buscaglia@ge.ieni.cnr.it

The modification of the surface properties of particles by coating with a different material, resulting in the formation of core-shell structures, is a well-known process. However, the consolidation of core-shell particles in bulk ceramics has not been extensively investigated yet, mainly because of the difficulty in controlling interdiffusion and interface reactions. In this study, we have coated BaTiO₃ spherical templates with SrTiO₃ and BaZrO₃ using a precipitation process from inorganic precursors. The size of the particles as well as the overall composition can be tailored over a wide range. Densification of the resulting core-shell particles was accomplished either using conventional sintering or spark plasma sintering. Dense ceramics with a graded composition at the level of the single grains could only be obtained by careful choice of the sintering conditions. The final ceramics show strongly modified dielectric properties in comparison to both the parent compounds and the homogeneous solid solutions. The proposed approach is quite generic and suggests new possibilities for the realization of polycrystalline materials with local graded structure by the controlled sintering of core-shell particles.

THE EFFECT OF ANIONIC SURFACTANT ON THE Sr-HEXAFERRITE NANOCRYSTALLINE POWDER SYNTHESIZED BY A SOL-GEL AUTO-COMBUSTION PROCESS

M. GHOBEITI HASAB¹, S.A. SEYYED EBRAHIMI¹, A. BADIEI²

¹Center of Excellence in Magnetic Materials, School of Metallurgy and Materials. University of Tehran, Tehran, Iran.

²Department of Chemistry, Faculty of Science, University of Tehran, Tehran, Iran.

saseyyed@ut.ac.ir

Sr-hexaferrite powders synthesized by a sol-gel auto-combustion process using sodium dodecyl sulfate (SDS) as an anionic surfactant were studied for first time in this research. The influence of the amount of the surfactant on the synthesis process and physical properties of powders were investigated by scanning electron microscopy (SEM), fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD) techniques. With addition of this surfactant in the molar ratio of surfactant/strontium: 0.4, the combustion rate increases significantly and single phase Sr-hexaferrite forms by calcination at 800 °C, with average crystallites size of 26.7 nm.