

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Synthesis and characterization of novel high energy density capacitors for green energy VENKATA S. PULI, ASHOK KUMAR, RAM S. KATIYAR, Department of Physics and Institute for Functional Nanomaterials, University of Puerto Rico, San Juan, Puerto Rico 00931-3343, USA — We have developed lead free high energy density capacitor materials, $\{\text{Ba}(\text{Zr}_{0.2}\text{Ti}_{0.8})\text{O}_3\}_{(1-x)}\{(\text{Ba}_{0.7}\text{Ca}_{0.3})\text{TiO}_3\}_x$ [$x = 0.10, 0.15, 0.20$ (BZT_(1-x)BCT_x)] with high dielectric constant and moderate breakdown voltage. The ceramic materials were prepared using high energy ball milling for 4 hours at 400 rpm. The ball milled powders were calcined at 1250°C for 10hrs. Ceramic pellets having 13mm diameter were prepared using hydraulic press (2 ton) and sintered at 1400°C-1500°C for 4 hrs. X-ray diffraction studies of the sintered pellets revealed the rhombohedral/pseudo cubic crystal structure. The crystal structure was further confirmed by Raman spectra and TEM analysis. High dielectric constant and moderate polarization ($\sim P_s \sim 15\text{-}25 \mu\text{C}/\text{cm}^2$) were obtained in the sintered pellets. The SEM images revealed monolithic grain growth in samples sintered at 1500°C. Preliminary data show moderate breakdown field $\sim 15\text{-}20 \text{ kV}/\text{cm}$ and energy density of $0.12\text{-}0.3 \text{ J}/\text{cm}^3$ for all compositions. Details of the results will be presented.

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Date submitted: 27 Nov 2010

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