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Title of the abstract

Structural Analysis of Neutron-Irradiated co-doped $(Ba_{0.88}Ca_{0.12}Ti_{0.975}Sn_{0.025})O_3$ Ceramic

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Table of contents

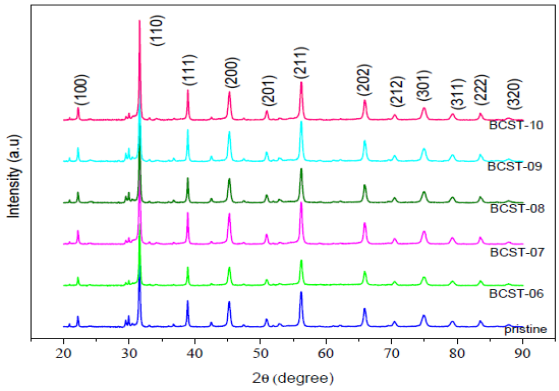

Figure 1.: XRD patterns of pristine and irradiated $(Ba_{0.88}Ca_{0.12}Ti_{0.975}Sn_{0.025})O_3$ ceramic

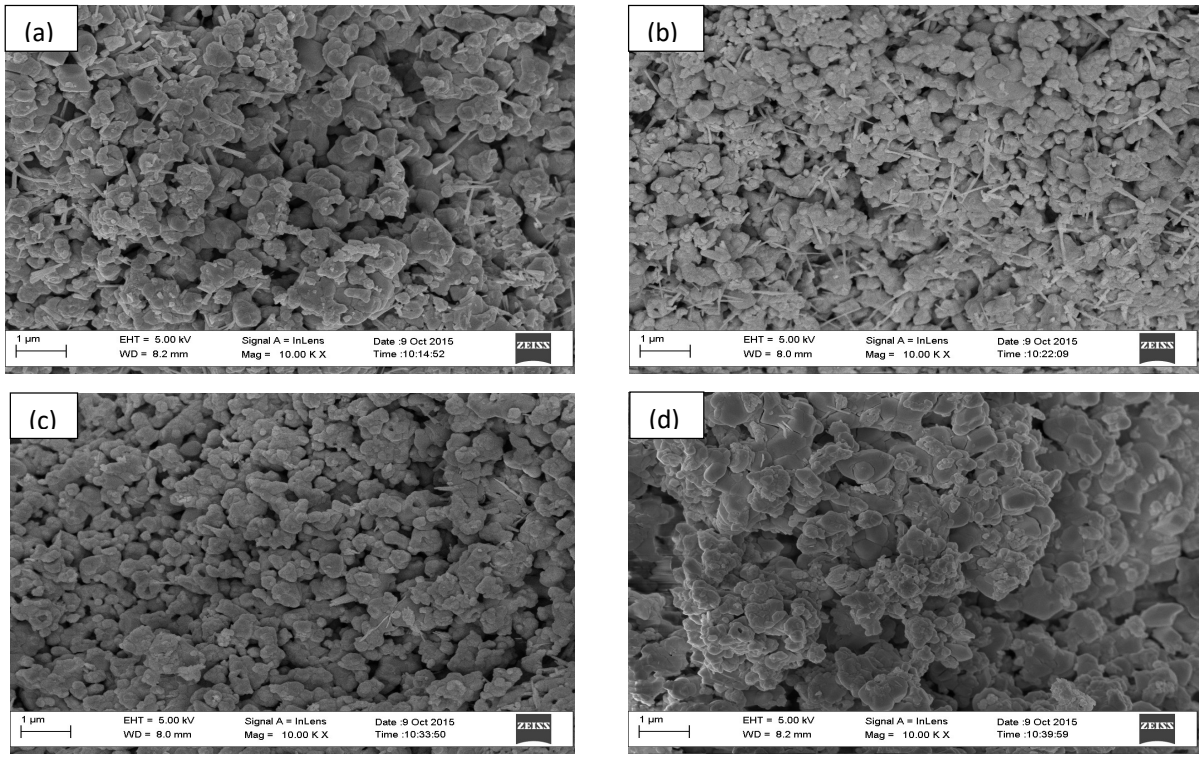

Figure 2: HRSEM micrographs of (a) pristine (b) BCST-06 (c) BCST-07 (d) BCST-08

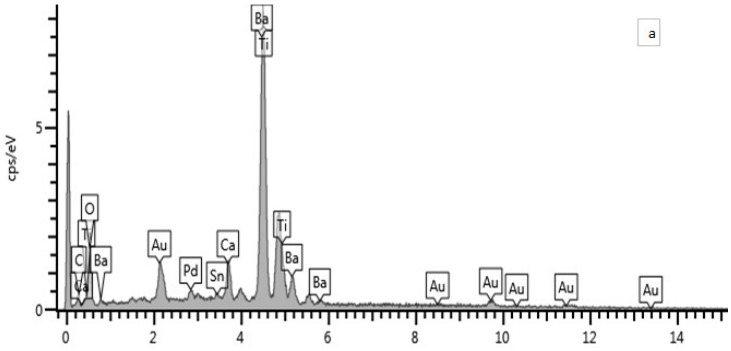

Figure 1.4: EDS spectrum of (a) pristine co-doped $BaTiO_3$

On/off-switchable zipper-like super-thin power bioelectronics.

ABSTRACT

Barium Calcium Stannate Titanate ($Ba_{0.88}Ca_{0.12}Ti_{0.975}Sn_{0.025})O_3$ ceramic synthesised by solid state reaction was subjected to neutron irradiation fluence of up to 10^{10} n/cm^2 using Am-Be neutron source. The pristine and irradiated samples were investigated and characterised by X-ray diffraction and SEM/EDS. XRD patterns confirmed the ceramic is single crystalline phase with the tetragonal perovskite structure which did not change after irradiation. The average crystallite size increased from 26.35 nm for pristine sample to 28.32, 26.89, 27.05, 27.25, 28.50 nm for samples irradiated at 0.0, 8.10×10^5, 9.72×10^7, 8.75×10^8, 6.99×9 and 1.399×10^{10} n/cm^2 neutron fluence, respectively. Similarly, the c/a (tetragonality) ratio was virtually constant. Average grain sizes of 5.80, 10.20, 6.70, 11.19 and 13.07 μm were obtained. The pristine sample showed some agglomerations with fairly fined grained microstructure and rod-like grains while the sample irradiated at 8.10×10^6n/cm^2 has lesser agglomerations of grains. The rod-like microstructure disappeared and a relatively homogeneous microstructure arose upon irradiation of fluence 9.72×10^7, 8.75×10^8, 6.99×9 and 1.399×10^{10} n/cm^2. Elemental analysis confirmed the presence of Ba, Ca, Ti, Sn and O in the pristine sample. It is concluded that neutron irradiation may not affect the ferroelectric and dielectric properties and the material is safe to use in neutron radiation environment of these fluence.

Keywords: Barium Titanate ; Neutron irradiation; Ferroelectricity; structure analysis .

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