TUNING THE MICROSTRUCTURE OF FLASH SINTERED BZT-BCT CERCAMICS TO OBTAIN ENHANCED AND SINGULAR PROPERTIES

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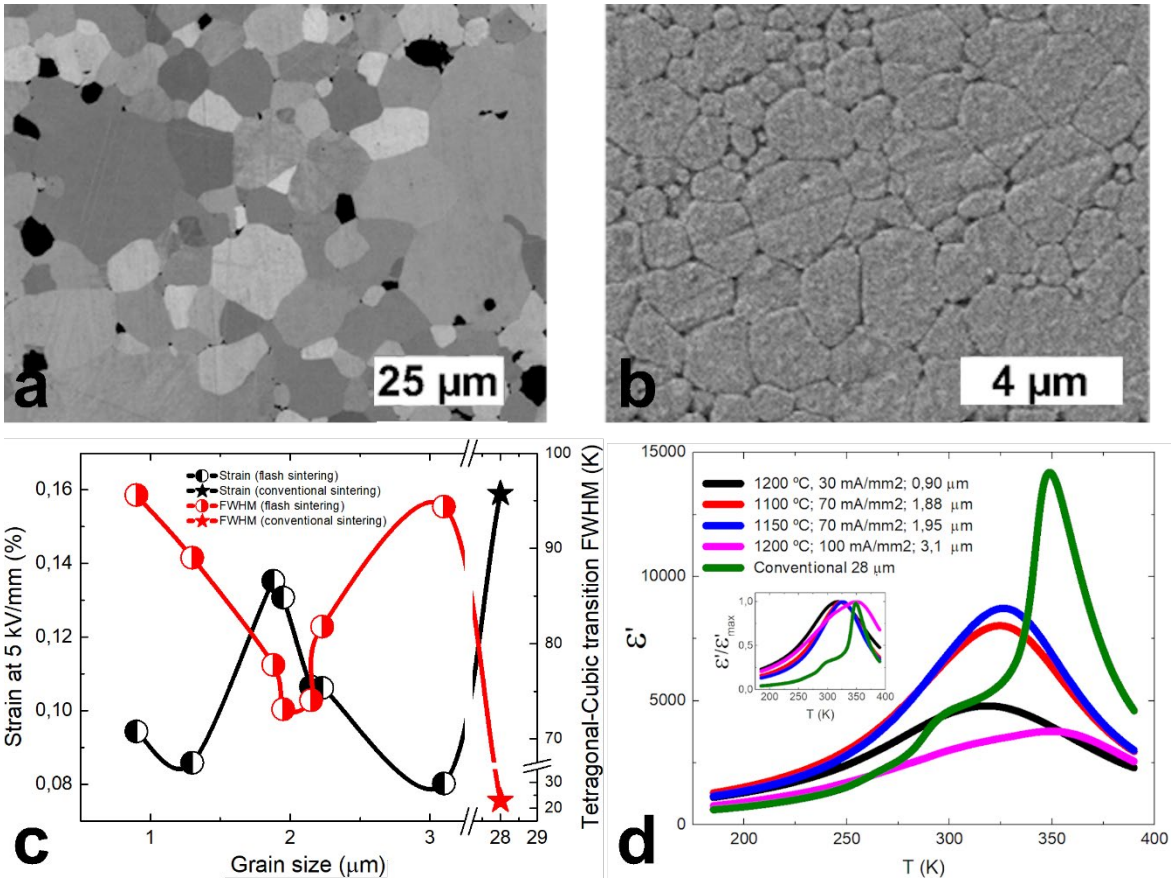
High performance lead-free piezoceramics are being extensively researched in order to substitute conventional highly contaminant materials. In this regard, $Ba(Zr_{0.2}Ti_{0.8})O_3$-$(Ba_{0.7}Ca_{0.3})TiO_3$ (BCZT) system stands out for room temperature transducer applications due to its high piezoelectric charge coefficient obtained for system compositions at the morphotropic phase boundary. Flash sintering is used to densify this system not only due to its characteristic energy efficiency and ease of implementation, but also in order to prevent the abnormal grain growth which is distinctive of the conventional sintering route. An exhaustive control of the flash sintering parameters allows fine tuning of the microstructure and therefore functional properties. Results suggest the existence of a narrow microstructure region with small grain sizes in which functional properties are comparable to those of conventional sintered samples, but with a size an order of magnitude smaller



(a) SEM micrograph of a BCZT sample conventionally sintered at 1450 ºC for 4 h; (b) SEM micrograph of a flash sintered BCZT sample at 1150 ºC for 30 min; (c) grain size dependence of strain (black) and dielectric peak full width at half maximum (red) for different sintered samples. Flash sintered samples are marked with circles, conventionally sintered sample is marked with stars; (d) dielectric response of previous samples.