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Structural, dielectric, piezoelectric and impedance study of a new lead free ferroelectric ceramics (Ba,M)(Ti,M')O₃, M=Ca;Sr and M'=Sn;Zr

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The dielectric properties and microstructure of co-doped B-site and A-site BaTiO₃ solid solution of the type (Ba,M)(Ti,M')O₃ were investigated. The influence of extremely small amount of Sr, Sn, Zr and Ca dopants on the microstructure and the dielectric characteristics of BaTiO₃ were studied systematically. These compositions were designed using the conventional mixed oxide technique and the XRD analysis results indicated that no secondary phase was formed. The microstructure of sintered pellets was studied by SEM at room temperature. The dielectric measurements showed that the BSTZ ceramic present the highest permittivity at 25°C and 100 kHz with the value of 2600, whereas the crystallite size was found to approach 32.3 nm. The BaTiO₃ ceramic with Sr at A-site has no phase transition above room temperature, while ceramics with Sn at B-site present ferroelectric – parraelectric transition with sharp transition. Finally, the ceramic with Zr at B-site exhibit normal ferroelectric-parraelectric transition with T_c=97°C. The effect of doping was been studied and analyzed using the AC complex impedance spectroscopy technique to obtain the electrical parameters of polycrystalline samples in a wide frequency range at different temperatures. The piezoelectric properties were also studied.

Biography

H Msouni is currently a PhD student in the University of Cadi Ayyad (Morocco). She is working on a project in collaboration with the University of the Littoral Cote d'Opale (France) financed by PHC (Hubert Curien TOUBKAL Program).

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