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PROCEEDINGS

Dielectric properties of TiO_2 co-doped with yttrium and niobium

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The effects of small contents (up to10 mol%) of Y_2O_3 and Nb_2O_5 on the microstructure and dielectric properties of TiO_2 were investigated, aiming to identify the underlying mechanism in the colossal permittivity of co-doped specimens. Sintered materials were prepared by the solid state reaction method and characterized by X-ray diffraction, scanning electron microscopy, and electrochemical impedance spectroscopy. All sintered specimens exhibited the characteristic tetragonal TiO_2 rutile phase. Secondary phases were detected at the grain boundaries, independent on the sintering temperature. The mean grain increased with both sintering temperature and co-dopants content. The higher electric permittivity was obtained for specimens with 5 mol% of co-dopants, sintered at 1480ºC, and the lowest value of the dissipation factor for samples with 10 mol%, sintered at 1500ºC. The dielectric properties of co-doped TiO_2 were attributed to the internal barrier layer capacitance and electron-pinned dipole defect mechanisms.
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