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Colossal Permittivity in In + Nb co-doped TiO2

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In + Nb co-doped TiO_2 has been previously investigated and shown to display colossal permittivity ($\epsilon_1 > 10^3$) for frequencies less than or equal to 1 MHz using impedance spectroscopy. In this work the lattice vibrational contribution to the low frequency dielectric function is studied in ceramic samples at the 0\%,5\%, and 10\% doping level using temperature-dependent reflectance spectroscopy. It is found that the soft mode behaviour exhibited by the lowest frequency infrared ibrational mode in pure TiO_2 is not strongly affected by the co-doping. There is a large discrepancy between the ϵ_1 measured at the lowest far infrared frequencies in this reflectance spectroscopy study ($\approx$ 1.5 THz) and the value measured below 1 MHz.

Authors: CRANDLES, David (Brock University); YEE, Susan

Presenter: YEE, Susan

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