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Colossal Permittivity in In + Nb co-doped TiO₂

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In + Nb co-doped TiO₂ 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 vibrational mode in pure TiO₂ 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 (≈ 1.5 THz) and the value measured below 1 MHz.

Primary authors: CRANDLES, David (Brock University); YEE, Susan

Presenter: YEE, Susan

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