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Electrode effects in dielectric spectroscopy measurements on (Nb+In) co-doped TiO₂

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Recently, several papers reported the discovery of giant permittivity and low dielectric loss in (Nb+In) co-doped TiO₂. A series of tests was performed which included the measurement of the frequency dependence of the dielectric permittivity and ac conductivity of co-doped (Nb+In)TiO₂ as a function of electrode type, sample thickness and temperature. The data suggest that the measurements are strongly affected by the electrodes. The consistency between four contact van der Pauw dc conductivity measurements and bulk conductivity values extracted from two contact ac conductivity measurements suggest that the values of colossal permittivity are, at least in part, a result of Schottky barrier depletion widths that depend on electrode type and temperature.

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