New Understanding of Dielectric Loss in Transition Metal Oxides

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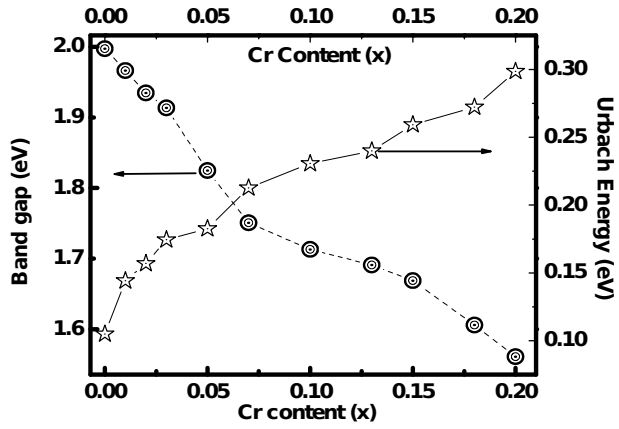
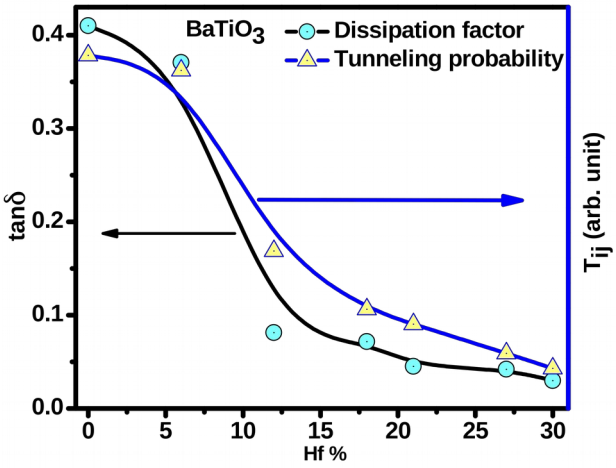
The search for the new materials for various electronic applications have dominated the research worldwide particularly after the development of silicon based tiny integrated circuits and $BaTiO_3$ based tiny capacitors. During last five decades the nature of electronic devices has witnessed huge changes. Very small as well as energy efficient electronic devices are replacing the conventional electronic circuit elements. While using these materials for dielectric application it is important to know the possible origin of dielectric loss. In this regard a new model considering the band-gap, Urbach energy and corresponding tunneling probability i.e $T = C\exp\left(\frac{-E_g - 2E_u}{2kT}\right)$ has been proposed and verified tor two series of transition metal oxides. https://doi.org/10.1016/j.ceramint.2019.01.177





https://link.springer.com/article/10.1007/s10854-019-01128-z

Disorder Induced Phonon Modes in Perovskite Oxides

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Inclusion of structural disorder by doping at B site in $PrFeO_3$ and $BaTiO_3$ is observed to generation of disorder phonon modes in Raman spectra. In the case of $PrFeO_3$, these modes are suggested to be due to change in crystallographic symmetry. However, researchers at material research laboratory of IIT Indore proposed that the new phonon modes are not be due to change in structural symmetry but are disorder phonon modes by using high resolution structural and Raman spectroscopy experiments. https://doi.org/10.1088/1361-648X/ab1195.