

Size-dependent Anomalous Dielectric Behavior in La_2O_3 : SiO_2 Nano-glass Composite System

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An intriguing anomalous dielectric behavior is observed in nanoparticle (NP) La_2O_3 : SiO_2 nano-glass composite system synthesized via sol-gel route at different calcination temperatures. Temperature dependent dielectric properties exhibit a notable dielectric broadening, indicating of diffuse phase transition with high ϵ' , quite different from and much higher than pure bulk La_2O_3 and SiO_2 . We postulate such dielectric effect in the context of the oxygen vacancies of the rare earth oxide nano-glass composite, where lattice strain related with NPs and their size plays a vital role. Such a material might be treated as a potential candidate to solve the problem of devices miniaturization.