

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Size dependent anomalous dielectric behavior in nanoparticle Gd_2O_3 : SiO_2 glass composite system SUDIP MUKHERJEE, YU-HSING LIN, TING-HUI KAO, C.C. CHOU, H.D. YANG, Department of Physics and Center for Nanoscience and Nanotechnology, National Sun Yat-Sen University, Kaohsiung, 804 Taiwan — Gd_2O_3 (0.5 mol%) nanoparticles have been synthesized in a silica glass matrix by the sol-gel method at calcination temperatures of 700 °C and above. Compared with the parent material SiO_2 , this nano-glass composite system shows enhancement of dielectric constant and diffuse phase transition along with magnetodielectric effect around room temperature. Observed conduction mechanism is found to be closely related to the thermally activated oxygen vacancies. Magnetodielectric behavior is strongly associated with magnetoresistance changes, depending on the nanoparticle size and separation. Such a material might be treated as a potential candidate for device miniaturization.

Sudip Mukherjee
Dept of Physics and Center for Nanoscience and Nanotechnology,
National Sun Yat-Sen University, Kaohsiung, 804 Taiwan

Date submitted: 24 Nov 2010

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