Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

A novel colossal magnetodielectric effect in Er_2O_3 nanoparticle embedded SiO_2 glass matrix around room temperature SUDIP MUKHERJEE, CHING HSUAN CHEN, CHIH CHIEH CHOU, Department of Physics and Center for Nanoscience and Nanotechnology, National Sun Yat-Sen University, Kaohsiung, 804, BIJAY KRISHNA CHAUDHURI, Indian Association for the Cultivation of Science, Jadavpur, Kolkata 700 032, India, HUNG-DUEN YANG, Department of Physics and Center for Nanoscience and Nanotechnology, National Sun Yat-Sen University, Kaohsiung, 804 — An intriguing colossal magnetodielectric (MD) behavior is observed in nanocrystalline Er_2O_3 (0.5 mol%) embedded SiO_2 glass matrix synthesized via sol-gel route. At around 9 T magnetic field, the dielectric constant of this superparamagnetic Er_2O_3 nanoparicle ($\sim$5 nm) composite reached almost $\sim$2.75 times the corresponding value of pure Er_2O_3. The MD effect arising due to the strong coupling between the magnetic moment and the lattice strain depends on the nanoparticle size and separation, which can be controlled by proper annealing. This novel MD system might be treated as a potential candidate for device miniaturization.

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

Date submitted: 17 Nov 2009 Electronic form version 1.4