

Abstract Submitted  
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**Terahertz time domain spectroscopy of ordered and disordered half-doped manganites**<sup>1</sup> K.R. MAVANI, M. NAGAI, H. YADA, K. TANAKA, D.S. RANA, I. KAWAYAMA, M. TONOUCI, DEPARTMENT OF PHYSICS, KYOTO UNIVERSITY, JAPAN TEAM, INSTITUTE OF LASER ENGINEERING, OSAKA UNIVERSITY, JAPAN COLLABORATION — Terahertz (THz) time domain spectroscopic studies were carried on  $\text{Nd}_{0.5}\text{Ca}_{0.5}\text{MnO}_3$  and  $\text{Nd}_{0.5}\text{Ca}_{0.48}\text{Ba}_{0.02}\text{MnO}_3$  (NCBMO) charge-ordered (CO) manganite thin films. Temperature dependent complex optical conductivity ( $\tilde{\sigma} = \sigma_1 + i\sigma_2$ ) was studied to probe the cation disorder effects on low energy charge dynamics. The frequency dependent  $\sigma_1$  suggests formation of charge-density-waves in these manganites. A doping induced cation disorder, as in the case of NCBMO, weakens the CO state.<sup>1</sup> However, at THz frequency, there are subtle effects of disorder on  $\tilde{\sigma}$  of NCBMO in a definite low temperature range. As temperature increases to 150 K (Néel temperature), changes are observed on the trends of temperature dependent dielectric constant ( $\varepsilon_1$ ) and  $\sigma_1$ . The Ba doping effects are dominant above the charge-ordering transition temperature. The  $\varepsilon_1$  and  $\sigma_1$ , both increase with temperature and show a scaling relationship,  $\varepsilon_1 \propto \sigma_1$ , that is consistent with similar result observed for (PrCaSr)MnO<sub>3</sub> manganite.<sup>2</sup> <sup>1</sup>Mavani *et al.*, Europhys. Lett. (in print). <sup>2</sup>Pimenove *et al.*, Phys. Rev. B 73,220407(R).

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K.R. Mavani

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