Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

In-plane anisotropy of Seebeck coefficient in slightly doped $YBa_2Cu_3O_y$ KOUJI SEGAWA, YOICHI ANDO, Central Research Institute of Electric Power Industry, Japan — In order to observe one-dimensionality, which can be direct evidence for self-organization of electrons into charge stripes, we developed a detwinning technique for $YBa_2Cu_3O_y$ (YBCO) for a wide range of doping down to non-superconducting compositions. The temperature dependence and the doping dependence of the in-plane resistivity indicates that the observed anisotropy is not due to the Cu-O chains but due to an electron self-organization in the CuO_2 planes [1]. The in- plane anisotropy is also observed in the optical conductivity. The frequency dependence of the conductivity spectra indicates that the plasma frequency is isotropic and the resistivity anisotropy is caused by an anisotropic scattering rate [2]. In the present work we measured in-plane anisotropy of the Seebeck coefficient in slightly doped YBCO. From the isotropic plasma frequency, which is proportional to n/m^* in the Drude model, one expects that the Seebeck coefficient is isotropic. However, it turns out that S_a is larger than S_b in slightly doped samples. This result cannot be accounted for by the simple Drude picture, and thus the observed anisotropy highlights another peculiar aspect of the self-organization of electrons in cuprates. [1] Ando et al., PRL 88, 137005 (2002). [2] Y.-S. Lee et al., PRB 70, 014518 (2004).

Kouji Segawa
Central Research Institute of Electric Power Industry, Japan

Date submitted: 23 Nov 2004 Electronic form version 1.4