Transport Properties of κ-$(ET)_4Hg_{2.89}Br_8$
Investigated by Contactless Conductivity Measurement under Pressure

Hiroshi Oike[1], Kazuya Miyagawa[1], Kazushi Kanoda[1], Hiromi Taniguchi[2], Keizo Murata[3]
[1]*Department of Applied Physics, The University of Tokyo, Tokyo, Japan*
[2]*Department of Physics, Saitama University, Saitama, Japan*
[3]*Department of Material Science, Osaka City University, Osaka, Japan*
Email: tt086566@mail.ecc.u-tokyo.ac.jp

The organic conductor, κ-$(ET)_4Hg_{2.89}Br_8$, is regarded as a quasi-two-dimensional doped-Mott insulator with triangular lattice, where ET is bis(ethylenedithio)-tetrathiafulvalene. The Pressure (P)–Temperature (T) phase diagram determined by resistivity measurement is reported [1, 2]. The temperature dependence of the in-plane resistivity, $\rho_{//}$, is T-linear at low pressures and gradually changed to T-squared variation by applying pressure. In addition, the residual resistivity, ρ_o, increases as a function of P (P>1.8GPa) [2]. Although these features of $\rho_{//}$ are anomalous, one often encounters the problems of inhomogeneous currents injection, which makes it difficult to know the essential features of $\rho_{//}$ in the resistivity measurements with the conventional four-terminal method.

In the present work, we investigated $\rho_{//}$ of the title compound by AC susceptibility (χ) measurements since χ reflects $\rho_{//}$ in the normal state through the skin effect. Figures 1 and 2 show the pressure dependences of α and ρ_o/ρ_o(1.9GPa), respectively, where α is the power of temperature dependence of $\rho_{//}$. Because the present contactless method and the conventional four-terminal method are complementary to each other, it is confirmed that the crossover from the non-Fermi liquid to Fermi liquid behavior and the gradual increase of ρ_o above 1.8GPa are intrinsic in this system.

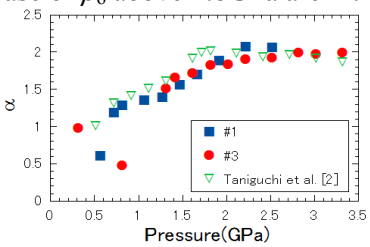

Figure 1. Pressure dependence of α

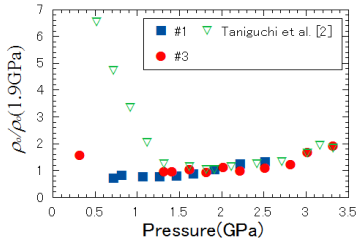

Figure 2. Pressure dependence of ρ_o/ρ_o(1.9GPa)

[1] Bud'ko *et al*., Sov. Phys. JETP. **74** (1992) 983.
[2] H. Taniguchi *et al*., J. Phys. Soc. Jpn. **76** (2007) 113709.