

## Comparison in physical properties between $\kappa$ -(MDT-TTF)<sub>2</sub>AuI<sub>2</sub> and $\kappa$ -(BEDT-TTF)<sub>2</sub>X

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MDT-TTF (methylenedithio-tetrathiafulvalene) is an organic asymmetric molecule shown in Fig 1. There is a superconductor based on MDT-TTF. That is  $\kappa$ -(MDT-TTF)<sub>2</sub>AuI<sub>2</sub> ( $T_c=4.3$ K) which has a molecular arrangement similar to that of the most representative organic superconductor  $\kappa$ -(BEDT-TTF)<sub>2</sub>X (X=monovalent anion). We performed a comparative study on physical properties between  $\kappa$ -(MDT-TTF)<sub>2</sub>AuI<sub>2</sub> and  $\kappa$ -(BEDT-TTF)<sub>2</sub>X, motivated by that this study is expected to give us the opportunity for solving the basic question that what needs the superconductivity in organics. In this regard, we investigated the transport properties such as electrical resistivity, Hall coefficient and Hall angle of  $\kappa$ -(MDT-TTF)<sub>2</sub>AuI<sub>2</sub> in the normal state.

A left panel in Fig 2 shows the temperature dependence of electrical resistivity,  $\rho$ , of  $\kappa$ -(MDT-TTF)<sub>2</sub>AuI<sub>2</sub> for various pressures. The normal state resistivity and superconductivity (inset) are monotonously suppressed with increasing pressure. The temperature dependence just above  $T_c$  was well fitted by a relation of  $\rho(T)=\rho_0+AT^2$  with constants,  $\rho_0$  and A, as shown in a right panel. This means that the low temperature resistivity is dominated by electron-electron scattering, which is in the similar situation to  $\kappa$ -(BEDT-TTF)<sub>2</sub>X. In addition, we found that  $\cot \Theta_H$  also obeyed the  $T^2$ -law in the wide temperature range where  $\Theta_H$  is the Hall angle. These behaviors are consistent with the Fermi liquid theory. Thus, we uncovered that, also in the  $\kappa$ -(MDT-TTF)<sub>2</sub>AuI<sub>2</sub>, the metallic state with strong correlation is necessary for superconducting condensation.

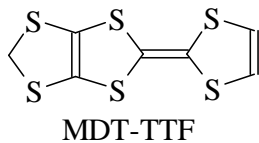


Fig.1 Molecule structure of MDT-TTF

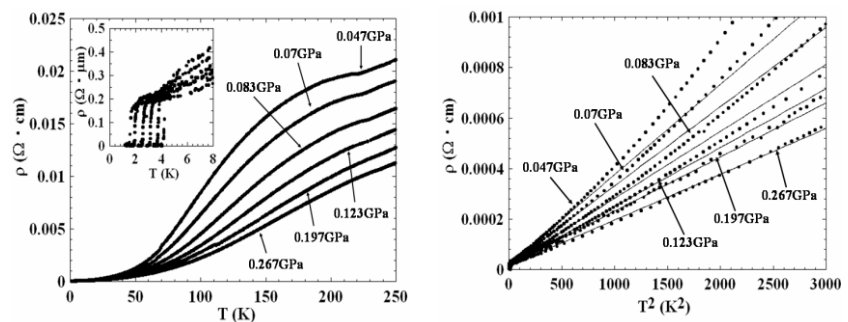


Fig 2. T-(left) and  $T^2$ -(right) dependences of  $\rho(T)$  of  $\kappa$ -(MDT-TTF)<sub>2</sub>AuI<sub>2</sub> for various pressures.