Impurity Effect on the Charge-Ordering State in α-(BEDT-TTF)$_2$I$_3$

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Recently, a quasi-two-dimensional conductor, α-(BEDT-TTF)$_2$I$_3$ salt attracts much attention because of the discovery of a mass-less Dirac particle under pressures [1,2]. The Dirac particle exhibits the zero-gap state (ZGS) which provides fruitful interesting phenomena. However, the ZGS is stabilized only under high-pressure, and α-(BEDT-TTF)$_2$I$_3$ salt undergoes a charge-ordering spin-singlet state transition around 135K at ambient pressure.

Hence we investigated the impurity effects on the spin-singlet (charge-ordering) state of α-(BEDT-TTF)$_2$I$_3$, and found that very small amount of chemical doping of BMDT-TTF influenced the low temperature electronic states. A large amount of the BMDT-TTF doping suppressed the first-order spin-singlet state transition around 135K observed in the pure sample; the metastable zero-gap state is stabilized at ambient pressure.

Up to doping range of 10%, the spin-singlet transition was gradually suppressed without obvious shift of the transition temperature. This fact suggests that the system was composed of multi-domains, *i.e.* spin-singlet and quenched phases. More than the doping range of 10%, the spin-singlet transition was completely suppressed and the high-temperature paramagnetic phase is stabilized down to the lowest temperature.

We will present the experimental results of the static magnetic susceptibility and ESR measurements in order to clarify the electronic state of the doped system.

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