Electronic States of a Strongly Correlated Two-dimensional System, $Pd(dmit)_2$ Salts, Controlled by Uni-axial Strain and Counter Cations

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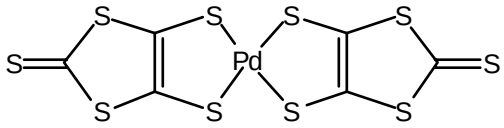
A series of isostructural anion radical salts β'-$Pd(dmit)_2$ salts with tetrahedral counter cations (Me_4Z and Et_2Me_2Z; Z=P, As, Sb) are classified into a strongly correlated two-dimensional system. The conduction layer consists of strongly dimerized $Pd(dmit)_2$ units forming a distorted triangular lattice, and is sandwiched by insulating cation layers. The half-filled conduction band originates from the HOMO of the $Pd(dmit)_2$ molecule. At ambient pressure, each salt behaves as a Mott-insulator and each temperature dependence of magnetic susceptibility is well explained by the model of the spin-1/2 Heisenberg triangular antiferromagnet [1]. This indicates a crucial role of the frustration in



$Pd(dmit)_2$

this system, which is supported by anomalous critical phenomena observed in the μSR experiment [2].

This system is a unique playground of the strong correlation physics. The electronic state of this system would be governed by the on-site Coulomb energy, the band width, and the degree of frustration, each of which is sensitive to the intra- and inter-dimer interactions. The application of hydrostatic pressure induces a variety of physical properties including superconductivity. We have also demonstrated that the uni-axial strain can effectively control the electronic state of $Me_4As[Pd(dmit)_2]_2$ [3]. We will report a systematic study of the uni-axial strain effect on various $Pd(dmit)_2$ salts and show that the choice of the counter cation changes the aspect of the uni-axial strain effect.

References

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2. S. Ohira et al., this symposium..
3. R. Kato et al., *Phys. Rev. B*, **66**, 020508 (2002).