ESR study on Ferromagnetic TDAE-C_{60} with Uniaxial Strain

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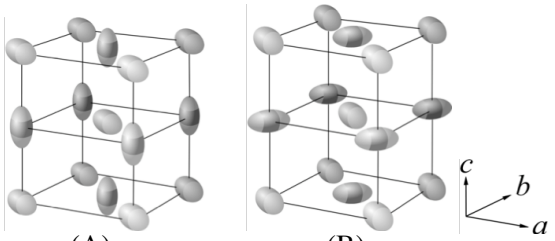
C_{60} mono-anion complexes with tetrakis(dimethylamino)ethylene (TDAE) have the highest Curie temperature (Tc=16 K) of all purely organic complexes. Although a variety of theoretical models for the ferromagnetism have been proposed, the most probable one might relate to the antiferro-orbital-ordering of Jahn-Teller distorted C_{60} balls. In this model, the Jahn-Teller orbitals on the neighboring balls are geometrically perpendicular to each other, which diminishes the transfer energy between the neighboring balls. This model requires special orientational ordering between the neighboring C_{60} molecules in one-dimensional chain along c-axis. Thus, we propose two models to realize the antiferro-orbital ordered structure, as demonstrated in Fig. 1; (A) the axes of distorted C_{60}'s are alternately arranged (parallel and perpendicular) along the c-axis and (B) they align always perpendicular to the c-axis and partially fulfills the antiferro-orbital structure in the a-b plane with different a and b lattice constants.

In this study, the uniaxial strain was applied along each axis to investigate what kind of interaction domaintes the ferromagnetism in TDAE-C_{60}. We will report the effect of uniaxial strain to Tc, which was determined from temperature dependence of ESR shift, and discuss which structure of (A) and (B) is realized in this system.



(A) (B)

Fig. 1. Two possible antiferro-orbital ordered structures.