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A Tight Binding two Band Study of Tunneling Conductance in Jahn-Teller Distorted iron based Superconductors

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Abstract. All the five d-electrons of iron based oxypnictide superconductor of compound MFeAsO (M = La, Ce, Sm, Nd) play an important role in the density of states (DOS) of the system. However the d_{xz} and d_{yz} orbitals contribute significantly to the electron density of the system near the Fermi level. Hence, a two band model is expected to explain correctly the electron properties of the system. We have adopted this two band model to investigate the tunneling conductance of the iron based system. Apart from nearest and next-nearest-neighbor electron hopping integrals, the model includes the Jahn- Teller (JT) type isotropic strain. The Hamiltonian is solved by using Zubarev's Green's function technique. Finally the tunneling conductance which is proportional to the electron density of states is calculated from the imaginary part of the electron Green's functions. The DOS is computed numerically by varying the physical parameters like JT coupling, elastic constant, temperature and chemical potential. The results are discussed in the paper.

Keywords: Iron-based superconductors, Jahn-Teller effect, scanning tunneling microscopy.

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