INVITED

IN IIB-2

Superconductivity of $(Sr_{0.9}La_{0.1})(Cu_{1-x}Ni_x)O_2$ Studied by Pressure Dependent Magnetization Measurements

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The electron-doped infinite-layer superconductor $Sr_{0.9}La_{0.1}CuO_2$ is characterized by the infinitely stacked CuO_2 layers separated only by metallic ions. Since the infinite-layer superconductor(ILS) contains no charge reservoir block between the CuO_2 layers, the distance between the CuO_2 layers is shortest among the cuprate superconductors and a strong coupling between CuO_2 layers and low anisotropy are expected for this material. Thus the ILS is a good candidate material to study the correlation between the CuO_2 inter-layer coupling and superconducting properties. With a small amount of Ni substitution into Cu site, the superconductivity is drastically suppressed resulting in the decrease of T_c from 43 K to 27 K with x = 0.01, which implies the ordering mechanism is conventional for this superconductor. Here we present our study of the superconducting properties of the electron-doped infinite-layer superconductor $(Sr_{0.9}La_{0.1})(Cu_{1-x}Ni_x)O_2$ (x = 0, 0.01) through M(T) and M(H) measurements under hydrostatic pressures up to 10 kbar as well as ρ(T) measurement in magnetic fields up to 9 T and specific heat measurement. Interestingly both samples did not show any noticeable effect of M(T) and M(H) in the superconducting state by pressures studied, possibly implying the CuO_2 inter-layer coupling is already strong enough compared to the effect of pressures up to 10 kbar. We will discuss our results in relation with the superconducting mechanism of the ILS $(Sr_{0.9}La_{0.1})CuO_2$.

keywords : infinite-layer superconductor, $Sr_{0.9}La_{0.1}CuO_2$, magnetization, pressure effects