Doping Evolution of Normal State Transport Properties in BiPb2201 Cleaved Thin Crystals

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Wide-range doping evolution of a series of BSCCO materials is less known than other typical cuprates like LSCO and YBCO. This is because severe oxygen reduction of BSCCO to reduce doping would cause decomposition of materials. So far, we have investigated systematic doping dependence of transport properties in a Bi2212 cleaved thin crystal. By annealing the cleaved crystal with thickness less than 100 nanometers either in oxigen or in argon atmosphere, T_c varies reversibly from $\approx$ 90 K (nearly optimum doping) to 0 K (superconductor-insulator transition) [1].
In this paper, we report on doping dependence of in-plane transport properties of $Bi_{1.7}Pb_{0.3}Sr_{1.65}La_{0.35}CuO_{6+\delta}$ (BiPb2201) cleaved thin crystals annealed under various conditions and Hall resistivity in pulsed high magnetic fields up to 60 Teslas. With decreasing carrier concentration from the optimum doping, T_c decreases more rapidly than the generic phase diagram empirically suggested by Tallon. This is attributed to the increase of carrier scattering of CuO_2 planes due to oxygen reduction through systematic measurements of in-plane Hall effect and resistivity. Hall ratio below T_c obtained by extrapolating the high-field Hall resistivity to $H \approx 0$ shows saturation to a finite value at $T = 0$ in a slightly under-doped sample.

[1]Y. Yamada *et al.*, Physica C**460-462**, 386 (2007)