

Boosting the critical temperature in Co-doped Ba122: a spectroscopic view.

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There have been several reports on the effects of annealing on enhancing the critical temperature in BaFe₂As₂ iron-pnictide superconductors [1-3]. Here we present transport and optical spectroscopy experiments on as-grown and annealed BaFe_{2-x}Co_xAs₂ crystals (x=0.2). Resistivity measurements show an increase in the superconducting critical temperature (T_c) from 18 K to 26 K, but susceptibility measurements indicate that the bulk of the material only becomes fully superconducting at somewhat lower temperatures (15 K and 19 K respectively).

To elucidate the origin of this T_c increase we investigate the normal state charge dynamics using optical spectroscopy. Even though the dc resistivity does not display striking differences upon annealing, the reflectivity very clearly displays a reduction of scattering as evidenced by a sharper plasma edge and an increase of the low frequency reflectivity. A more detailed analysis of the normal state optical conductivity unveils evidence for the emergence of Fermi liquid like behavior in the annealed sample.

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