

C-axis Polarized Optical Study on Thick $Ba_{0.67}K_{0.33}Fe_2As_2$ Single Crystal

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We report on a c-axis polarized optical measurement on a $Ba_{0.67}K_{0.33}Fe_2As_2$ single crystal. We find that the c-axis optical response is significantly different from that of high- T_c cuprates. The experiments reveal an anisotropic three-dimensional optical response with the absence of the Josephson plasma edge in $R(\omega)$ in the superconducting state. Furthermore, different from the ab-plane optical response, a large residual quasiparticle population down to $T \sim \frac{1}{5}T_c$ was observed in the c-axis polarized reflectance measurement. We elaborate that there exist horizontal nodes for the superconducting gap in regions of the 3D Fermi surface that contribute dominantly to the c-axis optical conductivity.

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