

Optical properties of mechanically-exfoliated $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$

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We report on the mid-infrared (0.175 to 0.65 eV) optical conductivity of mechanically exfoliated optimally-doped $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$ thin crystals on SiO_2/Si substrates. The conductivity of thicker (greater than 100 nm) samples is comparable to bulk while that of thinner (20 nm) samples is markedly suppressed and suggestive of insulating behaviour. We attribute this change to the presence of a degraded surface layer in our samples. Using an effective medium approximation, we are able to explain the observed trend and to extract the ‘intrinsic’ optical properties of BSCCO as a function of thickness. Our results indicate no thickness-induced change in the optical response of BSCCO samples as thin as 3 bilayers.

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