Optical conductivity of exfoliated Bi$_2$Sr$_2$CaCu$_2$O$_{8+\delta}$ nanocrystals

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— We report on infrared spectromicroscopy of mechanically exfoliated under-doped and optimally-doped Bi$_2$Sr$_2$CaCu$_2$O$_{8+\delta}$ thin crystals on SiO$_2$/Si substrates. The infrared reflectance and transmission was measured for samples of various thicknesses and the optical conductivity extracted in the frequency range 0.15 eV to 1 eV. Trends in the optical conductivity with thickness are discussed. In particular, we observe that the conductivity of thicker (\sim 100 nm) samples is comparable to bulk while that of thinner (\sim 20 nm) samples is markedly suppressed.

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