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Title

Anomaly in the Complex Conductivity of Overdoped  $Y_{1-x}Ca_xBa_2Cu_3O_{7-x}$  Thin Films from THz Spectroscopy

Source

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Abstract

We measured the complex conductivity of Ca-doped YBCO thin films in the THz frequency range. The films were measured using both Time domain and Frequency domain methods for THz spectroscopy. We show that a subgap exists in the overdoped samples of 5% and 10% Ca doping. The subgap appears as a sharp decrease in the real part of conductivity at frequencies equivalent to gap energy of 1 meV and is more prominent with increased doping. We suggest that this decrease in conductivity is related to a  $d(x^2-y^2)$ -wave pairing symmetry with an imaginary part of  $i$  or  $id_{xy}$ . The imaginary part of the conductivity shows the well-known  $1/i$  behavior, but its  $i^2$  product shows a dip in the spectrum at about  $\sim 1$  meV. (29 References).