9.7 cm

Vortex pinning in electron-doped cuprate superconductor $\mathbf{La_{2-x}Ce_xCuO_4}$

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We have measured the vortex pinning strength in thin films of electron-doped cuprate $La_{2-x}Ce_xCuO_4$ for various doping x from $x = 0.075$ ($T_c = 25K$) to $x = 0.15$, ($T_c = 12.5K$). Optimal doping for this compound is $x \approx 0.11$, at which $T_c = 29K$. Films were prepared by molecular-beam epitaxy method. Structural XRD investigation revealed no doping-induced lattice strain.
We use two-coil technique at frequencies from 10 to 100kHz. Superfluid density $n_s(0)$ grows rapidly with x on underdoped side and decreases slowly on overdoped side. The Labusch parameter κ, i.e. the spring constant for pinned vortex, shows large variations as doping changes. It increases with x rapidly to a maximum at slight underdoping and then decreases on overdoped sight more rapidly then $n_s(0)$. Even at optimal doping $\kappa(0)$is two orders of magnitude lower then the highest values observed in YBCO.

13.4 cm

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