

Magnetic susceptibility anisotropy of epitaxial films

$\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_4/\text{SrTiO}_3$

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The magnetic susceptibility in the high-quality epitaxial films $\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_4/\text{SrTiO}_3$ without annealing in underdoped region ($x = 0.135, 0.145$) and after annealing in overdoped region ($x = 0.18$) with different orientation of the c -axis was investigated. The electron doping is generated by replacing the Nd^{3+} ions in the parent compound Nd_2CuO_4 with Ce^{4+} to form a non-superconducting antiferromagnet $\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_{4+\delta}$. Additional annealing in oxygen-free atmosphere leads to suppress the static antiferromagnetic order and to appearance of the superconductivity. The strong anisotropic behavior of the magnetic susceptibility versus external magnetic field $\chi \parallel (H)$ and $\chi \perp (H)$ at $H < 10$ kOe and highly anisotropic temperature dependencies of the magnetic susceptibility $\chi \parallel (H)$ and $\chi \perp (H)$ at low magnetic field $H = 100$ Oe is associated with different magnetic ordering of Nd^{3+} (Ce^{4+}) rare earth magnetic ions and copper ions at different orientations of the external magnetic field with respect to the conducting planes of CuO_2 . The presence of the residual short ranged antiferromagnetic ordering of copper ions even in the over doping region leads to magnetic anisotropy in the conducting planes. Effects of Nd moment are included particularly in the low temperature regions [1].

References:

[1] Klepikova, A.S., Charikova, T.B., Popov, M.R., Stepanova, E.A., Ivanov, A.A., **J. Phys. Chem. Solids.**, Magnetic susceptibility anisotropy of electron overdoped high temperature superconductor $\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_4$, V. 148, p. 109770 (2021).

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