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Study of oxygen ordering in htc superconductors by magnetic resonance of different nuclei

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Abstract

NMR of 169Tm and NQR/NMR of 63/65Cu was applied to investigate the order of oxygen in the HTC superconductors of the type RBa2Cu301. From the spectra of three different lattice sites, one for Tm and two for Cu, it is evident, that three ordered structures exist: Tetra for x = 6.0, ortho-II for x = 6.5 and ortho-I for x = 7.0. No other ordered structures could be detected. A coexistence of ortho-I and -II is evident in a wide region between 6.6 and 6.8. The existence of extended domains of ortho-II is essential for the onset of superconductivity. In the tetragonal region below 6.3 we find mainly insulated oxygen ions in the Cu(1) plane; in superconducting samples of the 60 K plateau oxygen is ordered in chains of a mean length of about 12 oxygen ions. In the region of the 90 K plateau the chains become very long and the oxygen vacancies are clustered in empty fragments of chains. © 1993 IOP Publishing Ltd.

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