

THE ROLE OF PHONONS IN COLOSSAL MAGNETORESISTIVE MANGANITES AND HIGH TEMPERATURE SUPERCONDUCTING CUPRATES

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ABSTRACT

Manganites and cuprates with perovskite-like structure exhibit rich and interesting magnetic as well as electronic properties. The manganites show colossal magnetoresistive property and the cuprates show high temperature superconductivity. The underlying mechanisms in these materials are of intense pursuit worldwide. In this paper we discuss the role of phonons in the magnetic and electronic properties of these materials which are investigated using the ultrasound method. The manganites show pronounced lattice hardening and enhanced ultrasonic damping at the insulator-metallic transition temperature of 240 K. On the other hand, the two dimensional superconducting cuprates can be explained using the van Hove scenario where only a small electron-phonon coupling is necessary to achieve high transition temperature.

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