MAGNETOELASTIC DOMAIN STRUCTURE AND PHYSICAL PROPERTIES OF THE UNDERDOPED HIGH-TEMPERATURE SUPERCONDUCTORS

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S u m m a r y

A theoretical model is proposed which describes the newly discovered physical properties: the shape-memory effect and anisotropy of magnetoresistance in under-doped copper oxides. The key issue of the model is a magnetoelastic mechanism which governs the formation of a domain structure in antiferromagnets and also is responsible for the shape-memory effect in the paramagnetic state. The long-range "stray" field resulting from the difference between the bulk and surface elastic properties ensures a reversible change of the domain structure from the polydomain to single-domain state in an external magnetic field. In a paramagnetic state, the strong magnetoelastic coulping is a cause of anisotropy of the g-factor at a copper site and thus mediates between the external magnetic field and the domain structure of the sample. The obtained theoretical relations are in quantitative agreement with the available experimental data.