Tunneling Spectroscopy of the Colossal Magnetoresistive La_{0.7}Ca_{0.3}MnO_3 Epitaxial Films: Evidence of Half-Metallic Band-Structure In the Ferromagnetic State

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ABSTRACT:

We present tunneling spectroscopy data taken with a low-temperature scanning tunneling microscope on epitaxial films of the colossal magnetoresistive (CMR) perovskite La_{0.7}Ca_{0.3}MnO_3. At 77K, well below the Curie temperature, the normalized tunneling conductance (dI/dV)/(I/V)-1 exhibits pronounced peaks and gap-like structures, bearing notable resemblance to the half-metallic density-of-states spectrum calculated for the itinerant bands in the ferromagnetic state. These characteristics are absent at room temperature in the paramagnetic state, as well as in the undoped compound LaMnO_3 which shows no CMR behavior. We discuss these spectral differences in the context of exchange interaction between the itinerant electrons and its role for CMR in the manganites.

REFERENCES:


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