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Interface Mott Transition and Colossal Electroresistance TAKASHI OKA, CERC, National Institute of Advanced Industrial Science and Technology (AIST), NAOTO NAGAOSA, University of Tokyo — Colossal electroresistance – devices with huge nonlinear $I-V$ with hysteresis – found in strongly correlated materials is now receiving wide interest as a candidate of a novel nonvolatile memory. In order to design such devices, it is important to understand how phase transition takes place at the interface between SCES and an electrode. We propose a simple theoretical scheme to calculate the electronic state at such interfaces. A density matrix renormalization group (DMRG) calculation of a 1D tight binding model is performed, where we find that the Mott transition takes place, and by altering the external bias, we can change the transport property drastically from insulating to Ohmic (metallic). Next, we propose a mechanism of colossal electroresistance based on first order metal-insulator transition. In this mechanism, the switching between on and off states is realized by a hysteresis loop of bias voltage crossing the phase coexistence regime near the transition. (cond-mat/0509050, to appear in Phys. Rev. Lett.)

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