# Electroresistance in ferroelectric tunnel junctions and orbital reconstructions at oxide interfaces

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Epitaxial oxide heterostructures are being much explored to create functional devices. Among them, devices involving ferroelectric tunnel barriers have been shown to display a large electroresistance, which is believed to be associated to a change of the barrier height depending on the polarization direction. Here we show that the tunnel electroresistance (TER) across $BaTiO_3$ barriers sandwiched between $La_{2/3}Sr_{1/3}MnO_3$ (LSMO) and Pt metallic electrodes of hundred microns lateral size, reaches large TER values, up to $3x10^4$%. We carefully analyse the electrical properties of the junction and we discover that it displays unexpected metal-insulator-semiconductor-metal characteristics. It is also shown that the junction capacitance varies with polarization thus suggesting a change of barrier width with polarization [1], contributing to produce a large TER.
These results indicate that the interfaces at LSMO/BTO/Pt heterojunctions may be more complex than expected. To get some insight into interfacial effects, we performed polarized X-ray absorption experiments at Mn $L_{3,2}$ edges, gaining access to the electronic and magnetic configuration at the LSMO interfacial layers, when films are capped with different $ABO_3$ perovskites, $BaTiO_3$ among them [2]. It is found that capping can promote relevant electronic and magnetic reconstructions in the LSMO film, which is the bottom electrode in the measured tunnel devices. We will discuss these effects in connection with the electrical properties of the junctions.

**References**

1. Radaelli G. *et al.* Large Room-Temperature Electroresistance in Dual-Modulated Ferroelectric Tunnel Barriers. *Adv. Mater*. DOI: 10.1002/adma.201405117 (2015)
2. D. Pesquera et al. in preparation.

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