ELECTRONIC PROPERTIES OF MANGANITE-BASED SPIN-INJECTION DEVICES.

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Ferromagnetic perovskite manganites attract much attention because of the colossal magnetoresistance effect they exhibit in the bulk, and the high degree of spin polarization of the charge carriers (the optimally doped La(2/3)Sr(1/3)MnO3 -LSMO- has half-metallic properties). These features make manganites very appealing for spin-polarized current injection for the design of new devices in spintronics. We will present first principles calculations performed to characterize the electronic properties of contacts for two possible spin-injection devices.

A) In LSMO/SrTiO3/LSMO magnetic tunnel junctions [1], two ferromagnetic metallic electrodes are sandwiching a thin SrTiO3 (STO) insulating barrier. The tunneling magnetoresistance ratio (TMR) depends on the band alignments between LSMO and STO, and hence the need to know the Schottky barrier height to characterize these devices.

B) In the last few years substantial interest has arisen for devices were spin-polarized electrons are injected from ferromagnetic contacts into carbon nanotubes [2]. Motivated by recent experiments[3], we now study the contact induced spin-polarization in carbon nanotubes deposited over LSMO(001) surface as a function of the nanotube-surface separation.

References:

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