

Probing Surfaces and Interfaces of Manganites with Second-Harmonic Generation

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Surfaces and interfaces are under non-uniform and anisotropic fields. The resulting modification of the local electronic states can be the source of optical second-harmonic generation (surface or interface second-harmonic generation, S/I SHG). Usually, the electronic state modification is small and is limited to the minute mixture of the higher level states above the ground state. In the case of manganese oxides, however, a drastic change up to the reorganization of the ground state can result because of the strong electron correlation. Examples are emergence of ferromagnetism at the interface between two antiferromagnets and appearance of surface polarity on a centrosymmetric crystal. The spatial extent of the modification is limited to only a few unit-cell layers and thus the sensitivity of I/S SHG (especially its sensitivity to the local symmetry - electronic as well as magnetic - and subsurface monitoring capability) is essential. Because high quality single-crystalline film samples are crucial in the measurement, I will start with sample preparation and characterization and review our recent results searching for the drastic change in the materials properties at surfaces and interfaces of manganites.

* References: Appl. Phys. Lett. 102, 251911 (2013), Phys. Rev. Lett. 108, 157603 (2012), Adv. Mater. 22, 5507 (2010), Phys. Rev. B80, 241104 (2009)