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Resonant Inelastic Soft X-ray Scattering: electronic structure in transition metal oxides thin films and heterostructure and an update of the SIX beamline (NSLS-II)

High quality thin films and heterostructures of transition metal oxides (TMO) are becoming more and more available thanks to the progresses made in deposition techniques. New interesting phenomena can be created in these systems, compared to the bulk, by tuning the growth parameters (strain, thickness, etc...) or by creating interfaces with other materials. Resonant Inelastic Soft X-ray Scattering (RIXS) is a suitable tool for studying the electronic structure in TMOs, and it is particularly relevant for the study of thin films and heterostructures thanks to its high sensitivity and spatial selectivity. Using this probe, we have been able to unravel the ground state electronic structure in rare-earth nickelates and to investigate the electronic reconstruction at the interface of $\text{LaTiO}_3/\text{LaAlO}_3$. Further information could be extracted in these systems by enhancing the energy resolution, thus accessing smaller energy scales containing fingerprints of i.e. magnetic, lattice couplings. These experimental possibilities will become available at the SIX beamline of NSLS-II, currently under construction, and expected to deliver 100,000 resolving power for both beamline and spectrometer.