# Ferroic oxide heterostructures: the impact of the interface

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Transition metal oxides (TMOs) are characterized by a richness of properties spanning from colossal magnetoresistance to high-temperature superconductivity due to the strong coupling between charge, lattice, spin and orbital degrees of freedom. In the last decades, motivated by the prospective development of energy-efficient devices and inspired by the successful semiconductor-technology approach, many efforts have been devoted in refining the oxide-thin-film deposition methods in order to control the growth of TMOs with atomic precision. A critical consequence of this miniaturization is the increasing influence of the interfaces in determining the physical properties of the heterostructures under investigation.

To illustrate the significance of this scenario in ferroic systems I will focus on two different examples: first, I will discuss the interplay between thickness, strain and depolarizing field in determining the domain structure of the prototypical ferroelectric perovskite $BaTiO_3$. Afterwards, I will introduce the double perovskite insulating ferromagnet $La_2NiMnO_6$ and I will present the evolution of its electronic and magnetic properties in the ultrathin limit. In both cases I will highlight the crucial role of the interface in governing the macroscopic response of the material. Interface engineering can be a very powerful method to tailor the desired functionality in oxide heterostructures.

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