

From oxide nano-objects to nano-oxides: the central role of the metallic substrate.

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The impressive advances in the fabrication, characterization, and control of ultra-thin oxide films and nano-islands have fostered the development of theoretical concepts related to confinement and low dimensionality effects in these systems. Aside the intrinsic effects, the structural and electronic properties of oxide nano-objects are further modified by the interaction with the substrate. In the case of metallic supports, the substrate effect has essentially a two-fold nature and involves the constraint due to the structural mismatch at the oxide/metal interface and the response of the oxide object to the charge exchange at the interface. The interplay of these two effects may results in nano-scale oxide objects with unique characteristics which substantially differ from both their bulk and unsupported counterparts.

Relying on selected examples of oxide nano-objects which were the subject of recent experimental and/or theoretical studies, we will exemplify the effect of the metal substrate and discuss the consequences for the properties of nano-oxides, their structure, stoichiometry, and energetics.