UNL Department of Physics and Astronomy presents:

Emerging Phenomena at Correlated Oxide Nanostructures and Interfaces

PRESENTED BY
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THURSDAY
SEPT 9
4:00 PM
IN JH 136 & VIA ZOOM

Refreshments will be served in the JH 1st Floor Vending Area at 3:30

ABSTRACT

Capitalizing on the energy competition of charge itineracy with electron correlation and spin-orbit coupling, epitaxial complex oxide thin films and nanostructures can host a range of new functionalities that are inaccessible in the bulk form. In this talk, I will discuss the emerging phenomena in two types of correlated oxides resulting from such complex interplay. The first one is the colossal magnetoresistive (La,Sr)MnO_3. We have achieved a 50-fold enhancement of the magnetic crystalline anisotropy in nanostructured (La,Sr)MnO_3 by establishing a high strain gradient via periodic depth modulation [1], and realized voltage-control of the magnetic anisotroy using the ferroelectric field effect [2]. The second material system is the ferrimagnetic $NiCo_2O_4$ films. We have shown the critical role of epitaxial strain in stabilizing perpendicular magnetic anisotropy in ultrathin $NiCo_2O_4$ with thickness down to 1.5 unit cell. I'll also discuss the unusual magnetotransport properties of $NiCo_2O_4$, such as linear magnetoresistance, sign change in anomalous Hall effect, and topological Hall effect [3]. Our study points to effective routes for tailoring the electronic and magnetic properties of correlated oxides at the nanoscale, paving the path for their application in nanoelectronics and spintronics.

References

[1] A. Rajapitamahuni *et al.*, *PRL* **116**, 187201 (2016).
[2] A. Rajapitamahuni *et al.*, *PR Materials*, **3**, 021401(R) (2019).
[3] X. Chen *et al.*, *Adv. Mater.* **31,** 1805260 (2019).