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Magnetic Properties of Hybrid Systems

Jose de la Venta

Colorado State University, Department of Physics

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Abstract

Hybrid magnetic heterostructures allow the engineering of new material properties by creative uses of proximity effects. When two dissimilar materials are in close physical proximity the properties of each one may be radically modified or occasionally a completely new material emerges. By properly designing hybrid ferromagnet/oxides new magnetic properties arise unlike any known magnetic materials.

In a series of recent studies, we have investigated the static and dynamic magnetic properties of different hybrids of ferromagnets and vanadium oxides. The vanadium oxides (VO_2 and V_2O_3) are canonical examples of materials showing a first order structural phase transition and a metal to insulator transformation. Static properties such as the coercivity, anisotropy and magnetization and dynamical properties such as the microwave response are modified by the proximity effects. Our results indicate that the structural transformation and the nanoscale phase coexistence across the first-order phase transition of the oxides are responsible for the observations in these hybrid materials. The results suggest the existence of similar effects in other hybrid materials and give rise to interesting perhaps useful properties.

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Biography

Dr. de la Venta received his PhD in Physics from the University Complutense of Madrid, Spain in 2009. Following graduation, Dr. de la Venta joined the group of Prof Ivan Schuller at the University of California San Diego as a Postdoctoral Fellow, (2010-2013). Dr. Jose de la Venta is an Assistant Professor in the Department of Physics at Colorado State University since fall 2013. His current research interests lie within Experimental Condensed Matter Physics and Materials Science and include: magnetic, electronic, optical and structural properties of hybrid materials and devices.