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Easily Switchable Giant Magnetism Near Room Temperature MIKEL HOLCOMB, NAVID MOTTAGHI, GHADENDRA BHANDARI, GUERAU CABRERA, West Virginia University — In many areas of materials science and economics, competition is seen as an opportunity to obtain improved performance. Utilizing many techniques (bulk magnetometry, neutron reflectometry and resonant magnetic scattering), we have discovered and explored the existence of competing magnetic phases in many single layer thin films that results in giant negative magnetization. We have focused on the system of complex oxide $La_{0.7}Sr_{0.3}MnO_{3.}$ While transmission electron microscopy images show pristine epitaxial growth, the data supports that there are regions of different magnetic order. This results in interesting magnetic measurements, that share similarities with ferrimagnets with competing magnetic lattices. This competition results in spontaneous negative magnetization that aligns counter to a small applied magnetic field and inverted hysteresis loops near room temperature. This behavior has much in common with superparamagnetic nanoparticles. In this talk, the time, field and temperature dependence of these samples will be discussed to help understand this phenomenon. The switch from negative to positive magnetization effectively doubles the change in magnetization, important for some types of devices. We acknowledge funding support from NSF (DMR-1608656) and DOE (DE-SC0016176).

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