Scanning Tunneling Microscopy of Bilayer La$_{2-2x}$Sr$_{1+2x}$Mn$_2$O$_7$

**Single Crystals**$^1$ LEUJEN CHEN, XINZHOU TAN, SEONG HEON KIM, JEE-HOON KIM, J.-S. ZHOU, J.B. GOODENOUGH, ALEX DE LOZANNE, University of Texas at Austin — We employed a spin-polarized scanning tunneling microscope to image the (001) surface topography and spectroscopy in La$_{2-2x}$Sr$_{1+2x}$Mn$_2$O$_7$ ($x=0.32$, 0.40 & 0.52) single crystals below the Curie temperature. As the doping is increased from $x=0.3$ to $x=0.5$ the spins arrange themselves in antiferromagnetic, ferromagnetic, in-plane and out-of-plane configurations. From local density of states (LDOS) maps, we observed a charge density wave with a wavelength of about 1.6 nm along the tetragonal a or b axes in the $x=0.32$ sample, which is known to be ferromagnetic with spins perpendicular to the surface. On the other hand, the $x=0.52$ crystal is expected to be type A antiferromagnetic with spins parallel to the surface, which is confirmed by our LDOS maps.

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Leujen Chen
University of Texas at Austin

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