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Soft X-ray ARPES investigation of the nickelate Fermi surface in exchange biased $LaNiO_3$-$LaMnO_3$ superlattices FLAVIO BRUNO, S. MCKEOWN WALKER, A. DE LA TORRE, A. TAMAI, M. GIBERT, S. CATALANO, J-M. TRISCONE, University of Geneva, Switzerland, Z. WANG, F. BISTI, V. STROCOV, Swiss Light Source, PSI, Switzerland, F. BAUMBERGER, University of Geneva, Swiss Light Source PSI Switzerland and University of St Andrews UK
— We investigate (111)-oriented superlattices consisting of paramagnetic $LaNiO_3$ (LNO) and ferromagnetic $LaMnO_3$ (LMO). The field dependence of the magnetization in these heterostructures was measured at 5 K after cooling the sample in the presence of a 0.4 T field. Surprisingly, a shift of 15 mT in the magnetization loop towards negative fields along the magnetic field axis was observed [1]. If the same measurement is repeated in a (111) LMO thin film, no exchange bias is observed which implies that LNO is the driving force for the biasing effect exhibited by the heterostructures. Since LNO is a well-known paramagnetic material, the existence of exchange bias in the superlattices implies the existence of an interface-induced magnetic order. Here we use soft x-ray angle resolved photoemission spectroscopy –SX ARPES- to study the electronic band structure of LNO layers in these heterostructures. Due to the increase in photoelectron escape depth in the 500 – 1000 eV energy range, we are able to map the LNO Fermi surface below 7 u.c. of LMO. In this talk we will discuss the similarities and differences in the electronic structure between thin films of (111)-LNO and buried LNO-LMO interfaces.

[1] M.Gibert, et al, Nat. Materials, 11, 195 (2012).

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