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Probing the magnetic state of Ni in NdNiO3/La0.7 Sr0.3MnO3 bilayer

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Rich phase diagram [1] of oxide heterostructures such as rare earth nickelates (RNiO3) allows to play with their properties. In antiferromagnetic $NdNiO_3$ it has been shown that thickness can influence the type of magnetic ordering [2]. It has been proposed that interface has a strong impact on NNO magnetism. By ARPES and XMCD measurements, it has been shown that 5 u.c. NNO on top of 15 u.c. $La_{0.7}Sr_{0.3}MnO_3$ has different behavior than a single NNO layer. In this bilayer Ni moments are ferromagnetically oriented. The ARPES results suggest that magnetic layer extends far from interface. The aim of this project is to study magnetic state of Ni in NNO in contact with ferromagnetic LSMO as a function of NNO thickness. In order to do that we used X-ray Absorption Spectroscopy, X-ray Linear Dichroism and X-ray Magnetic Circular Dichroism at the Ni $L_{2,3}$ and Mn $L_{2,3}$-edges to estimate magnetic layer thickness. We have probed magnetic properties at NNO(5/8/10/20 u.c.)/LSMO(15 u.c.)//NGO bilayers. Ni moment shows ferromagnetic order even for the thickest NNO layer, Ni magnetic signal from all thicknesses looks surprisingly similar. On the other hand, magnetic signal from LSMO layer has remarkable changes depending on NNO thickness. Our results suggest that the magnetic coupling at NNO/LSMO interface is complex and affects both NNO and LSMO magnetic structure. In this poster we will present our XMCD results and present the next steps planned in order to have further insight in the interface magnetic coupling of this fascinating system.

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[1] G. Catalan, Progress in perovskite nickelate research, Phase transitions **81**, 729-749 (2008)
[2] M. Hepting, R. J. Green, Z. Zhong, M. Bluschke, Y. E. Suyolcu, S. Macke, A. Frano, S. Catalano, M. Gibert, R. Sutarto, F. He, G. Cristiani, G. Logvenov, Y. Wang, P. A. van Aken, P. Hansmann, M. Le Tacon, J. M. Triscone, G. A. Sawatzky, B. Keimer, and E. Benckiser, Nature Physics **14**, 1097–1102 (2018)

Position

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