

Altermagnetic property at a cuprate/manganite interface

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Using Resonant inelastic x-ray spectroscopy (RIXS) in conjunction with x-ray linear and magnetic dichroism (XLD/XMCD), we demonstrate an altermagnetic order at the interface of epitaxially grown heterostructure of Nd_{0.65}(Ca_{0.7}Sr_{0.3})_{0.35} MnO₃ / YBa₂Cu₃O₇. Cu-RIXS spectra and its polarization analysis indicate the presence of an usual [1,2] antiferromagnetic Cu-magnon mode corresponding to the bulk and a weakly dispersing lower-energy interfacial magnon mode, which exhibits a decreasing weight with increasing momentum transfer. This atypical magnon-behavior can be explained by a linear spin wave theory that takes into account a 2-D checkerboard-type orbital pattern made of dz² and dx²-y², coupled with a spin-order leading to 2-D altermagnetic property at the interface [3].

[1] M. Le Tacon et al., Phys. Rev. B 88,020501(R) (2013).

[2] M. Le Tacon et al., Nat. Phys. 7, 725 (2011).

[3] S. Sarkar et al., Accepted in PNAS Nexus, doi: <https://doi.org/10.1093/pnasnexus/pgae100s>.