Manipulating magnetism by strain in FeRh(001) thin films

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Symmetrically terminated FeRh (001) exhibit radically different magnetism by termination: a Rh-terminated film prefers ferromagnetism (FM), while an Fe-terminated one is stable in G-type antiferromagnetism (G-AFM)[1]. We extend our study to asymmetrically terminated FeRh (001) film with both termination at each side. This asymmetrical FeRh (001) film possess both FM and G-AFM, whose details depend on film thickness[2].

In this talk, we additionally consider strain effect on magnetism of both symmetrically and asymmetrically terminated FeRh(001) films. Compressive (tensile) strain along in-plane direction stabilizes G-AFM (FM). Furthermore, for 9-ML Rh-terminated film, there is a crossover from FM to G-AFM for 2% compressive strain, while unstrained one is stable in FM.

In the case of asymmetrically terminated FeRh(001) film, the number of layers of FM and G-AFM depend on strains as shown in Fig. 1. Moreover, magnetocrystalline anisotropy (MCA) is also controllable by strain, where the contributions from each of the Fe- and Rh-terminated surface, and the boundary where magnetism changes, are analyzed from the electronic structure.

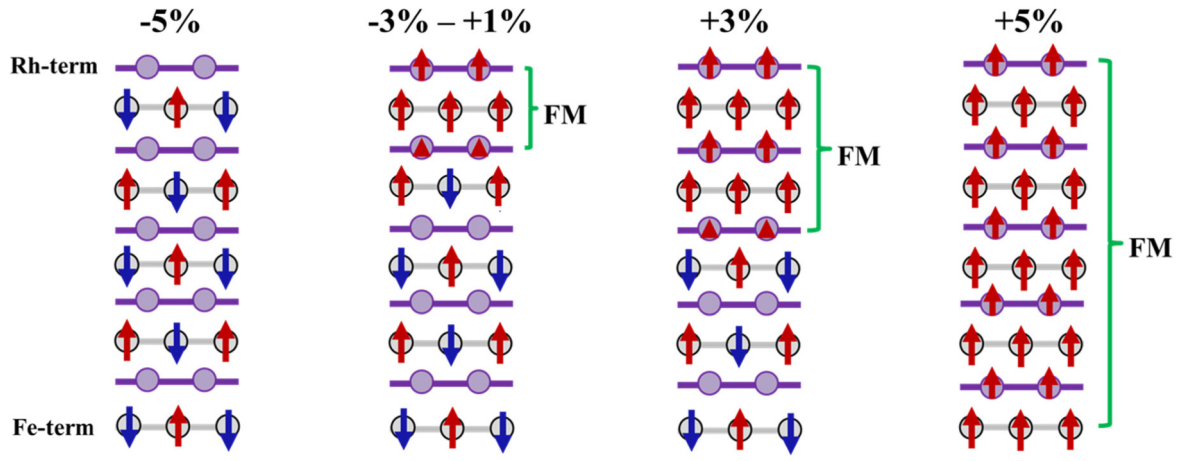

Fig. 1

References

[1] S. Jekal, S. H. Rhim, S. C. Hong, W. J. Son, and A. B. Shick, Phys. Rev. B, **92**, 064410 (2015).
[2] S. Jekal, S. H. Rhim, and S. C. Hong, accepted on IEEE Trans. Magn.