

Room-temperature ferrimagnet $\text{Co}_3\text{Mo}_{1-x}\text{Pt}_x$ thin films with flat band derived from Co-kagome lattice

Keiki Ishida¹, Kohei Fujiwara², Kazuki Nakazawa^{3,4}, Takumi Yamazaki⁵, Seigo Souma^{6,7}, Takeshi Seki^{5,7,8}, Daisuke Shiga^{9,10}, Hiroshi Kumigashira^{9,10}, Takafumi Sato^{6,7,8,11}, Yukitoshi Motome¹, Atsushi Tsukazaki^{1,3,5,12}

¹Dep. Appl. Phys. UTokyo, ²Dep. Chem. Rikkyo U., ³RIKEN CEMS, ⁴RIKEN RQC, ⁵IMR, Tohoku U., ⁶WPI-AIMR Tohoku U., ⁷CSIS, Tohoku U., ⁸SRIS, Tohoku U., ⁹IMRAM, Tohoku U., ¹⁰KEK, ¹¹Dep. Phys. Tohoku U., ¹²QPEC, UTokyo

Recent advances in topological kagome magnets have attracted considerable attention for topological quantum physics and correlated many-body physics. Their characteristic electronic structures, including flat bands, Dirac cones, and Weyl points, give rise to unconventional magnetic and transport properties [1].

Here, we report on the room-temperature ferrimagnet Co_3Mo films with a Co kagome lattice (**Fig. 1a**) with flat band located near the Fermi energy. As shown in **Fig. 1b**, the magnetization curves indicate that magnetocrystalline anisotropy mediated by spin-orbit coupling (SOC) is responsible for stabilizing perpendicular magnetic anisotropy (PMA). Furthermore, Pt-substitution in $\text{Co}_3\text{Mo}_{1-x}\text{Pt}_x$ films dramatically enhances the PMA due to strong SOC of Pt [2]. Temperature and magnetic field dependences of Hall effects were carefully examined to detect the variation of magnetic structures. In the presentation, we will discuss the results of Hall effect measurements, exhibiting anomalous Hall effect and emergence of topological Hall effect in specific Pt content films.

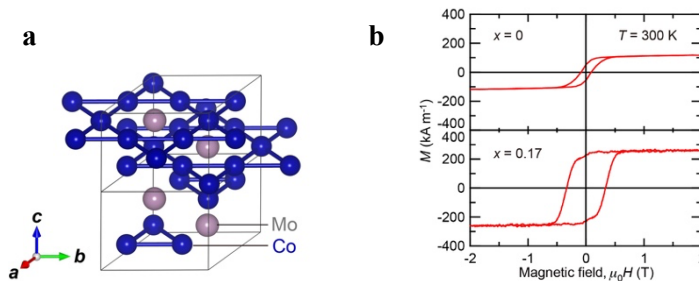


Fig. 1: a, D_{019} -type crystal structure of Co_3Mo . b, Magnetic field dependence of magnetization (M) at $T = 300\text{ K}$ for $\text{Co}_3\text{Mo}_{1-x}\text{Pt}_x$ with $x = 0$ (top) and $x = 0.17$ (bottom).

References

- [1] J-X. Yin *et al.*, *Topological kagome magnets and superconductors*, Nature **612**, 647 (2022).
- [2] K. Ishida *et al.*, *Room-temperature perpendicular-anisotropic ferrimagnet Co_3Mo mediated by cobalt-kagome flat band*, Commun Mater **7**, 116 (2026).