

RESEARCH ARTICLE

Doping-controlled spin reorientation transition and spin switching of $\text{Tm}_{1-x}\text{Pr}_x\text{FeO}_3$ Single Crystals

Jingxiu Liu¹, Zhijie Yang¹, Zeru Liu¹, Chenfei Shi¹, Haohuan Peng¹, Baojuan Kang¹, Rongrong Jia¹, Xiaoxuan Ma^{1,2,†}, Shixun Cao^{1,3,‡}

^a Department of Physics, Materials Genome Institute, Institute for Quantum Science and Technology, Shanghai University, Shanghai 200444, China

^b School of Material Science and Engineering, Shanghai University, Shanghai 200444, China

^c Shanghai Key Laboratory of High Temperature Superconductors, Shanghai University, Shanghai 200444, China

Corresponding authors. E-mail: [†]maxiaoxuan@shu.edu.cn, [‡]sxcao@shu.edu.cn

Received June 21, 2025; accepted August 26, 2025

Supplementary material

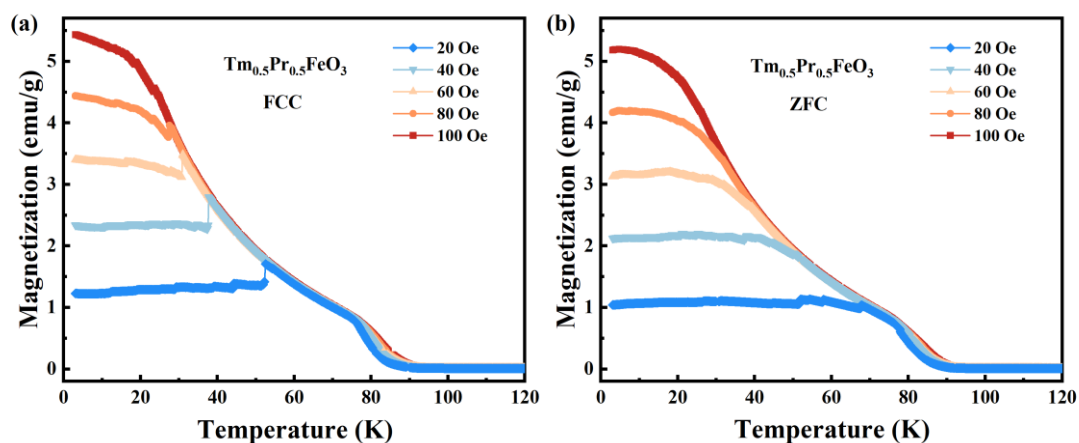


Fig. S1 M - T curves of $\text{Tm}_{0.5}\text{Pr}_{0.5}\text{FeO}_3$ single crystal in (a) FCC mode and (b) ZFC mode. S-II is observed along the a -axis in FCC mode of $\text{Tm}_{0.5}\text{Pr}_{0.5}\text{FeO}_3$ single crystal.

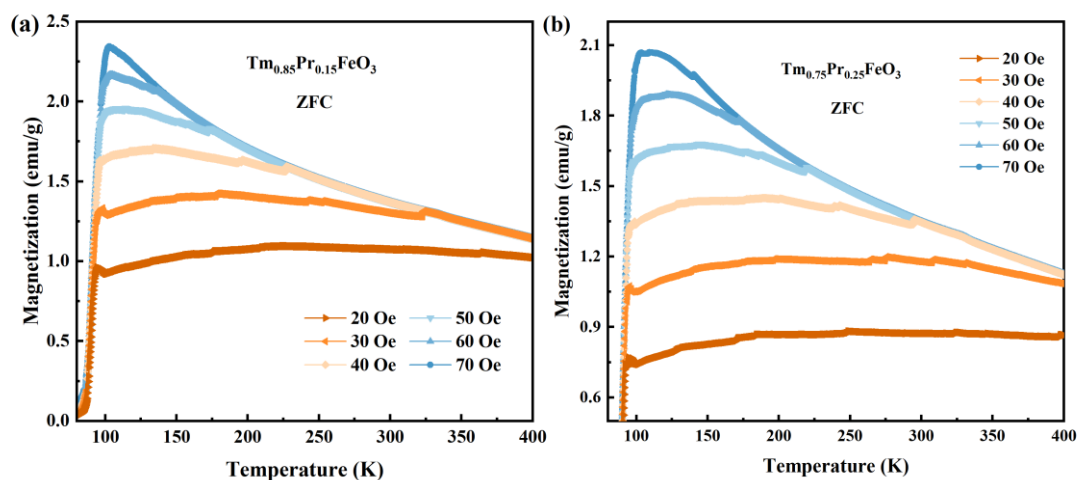


Fig. S2 ZFC curves of (a) $\text{Tm}_{0.85}\text{Pr}_{0.15}\text{FeO}_3$ and (b) $\text{Tm}_{0.75}\text{Pr}_{0.25}\text{FeO}_3$ single crystals. A weak S-II is observed along the a -axis in ZFC mode when $x=0.15$ and 0.25 .

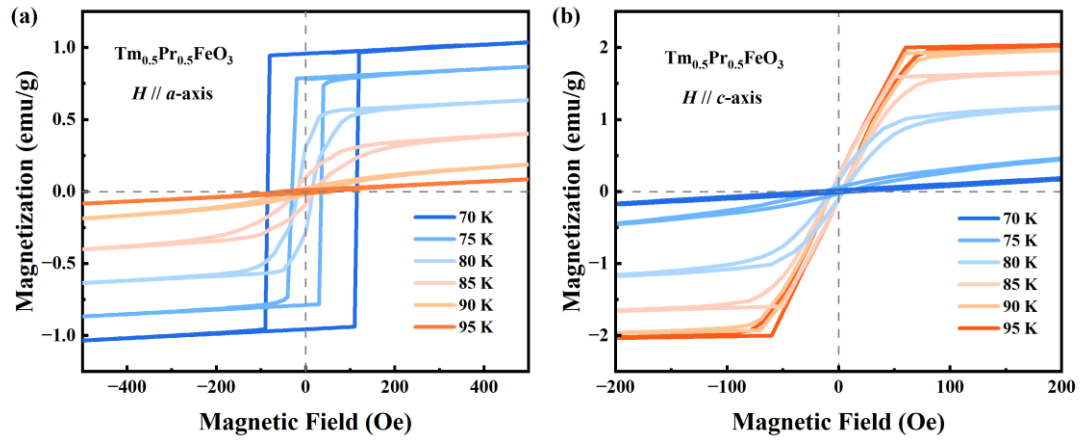


Fig. S3 M - H curves along the (a) a -axis and (b) c -axis of $\text{Tm}_{0.5}\text{Pr}_{0.5}\text{FeO}_3$ single crystal. With the increase of temperature, the magnetization along a -axis undergoes a transformation from a weak ferromagnetic state to an antiferromagnetic state, while the situation of a -axis is opposite.