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Doping controlled spin reorientation in dysprosium-samarium orthoferrite single crystals[1] SHIXUN CAO, WEIYAO ZHAO, BAOJUAN KANG, JINCANG ZHANG, WEI REN, Shanghai University — As one of the most important phase transitions, spin reorientation (SR) in rare earth transition metal oxides draws much attention of emerging materials technologies. The origin of SR is the competition between different spin configurations which possess different free energy. We report the control of spin reorientation (SR) transition in perovskite rare earth orthoferrite $Dy_{1-x}Sm_xFeO_3$, a whole family of single crystals grown by optical floating zone method from x=0 to 1. Temperature dependence of the magnetizations under zero-field-cooling (ZFC) and field-cooling (FC) processes are studied. We have found a remarkable linear change of SR transition temperature in Sm-rich samples for x>0.2, which covers an extremely wide temperature range including room temperature. The *a*-axis magnetization curves under FCC process bifurcate from and then jump down to that of warming process (ZFC and FCW curves) in single crystals when x=0.5-0.9, suggesting complicated 4f-3d electron interactions among Dy^{3+}-Sm^{3+}, Dy^{3+}-Fe^{3+}, and Sm^{3+}-Fe^{3+} sublattices of diverse magnetic configurations for materials physics and design. The magnetic properties and the doping effect on SR transition temperature in these single crystals might be useful in the spintronics device application.

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