

Extremely broad hysteresis in the magnetization process of α -Dy₂S₃ single crystal induced by high field cooling

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We have investigated magnetization process of α -Dy₂S₃ single crystal after cooling in the high magnetic field of 18 T. According to the previous report¹, which treats the anisotropic magnetization process after Z.F.C. (zero field cooling), the magnetization along the *a*-axis of orthorhombic system is smallest of those along three crystallographic axes at the conditions of $T = 1.5$ K and $\mu_0 H = 18$ T. The value for one Dy atom is small as $6 \mu_B$ which corresponds to 60 % of full saturation moment. In the present study, the magnetization under the field of 18 T along the *a*-axis on the cooling process from 150 K shows step-like rises at 70 and 40 K and reaches about $9 \mu_B$ at 1.5 K. After cooling, the magnetization isotherm of 1.5 K shows step-like drops at 3.0 and 1.7 T while decreasing field, and comes to $0 \mu_B$ at 0 T. Then, while increasing field, the magnetization demonstrates a similar curve to that obtained after ZFC without step-like rise below 13.1 T. At $\mu_0 H = 13.1$ T, the magnetization rises abruptly and agrees with the curve for the decreasing process. This irreversible magnetization process yields extremely broad hysteresis having width of $\mu_0 \Delta H = 11.4$ T. Such hystereses having different widths are observed also at 4.2 and 10 K.

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