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Magnetization and Phase Transitions in Single-Crystal $Tb_5(Si_{2.2}Ge_{1.8})$ ANDREW RING, HATTIE ZIEGLER, T. LOGRASSO, D. SCHLAGEL, JOHN SNYDER, DAVID JILES, Materials and Engineering Physics Program, Ames Laboratory, MATERIALS AND ENGINEERING PHYSICS PROGRAM TEAM, MATERIALS SCIENCE AND ENGINEERING DEPARTMENT TEAM — The $Tb_5(Si_xGe_{4-x})$ alloy system is similar to the $Gd_5(Si_xGe_{4-x})$ system although it has a more complex magnetic and structural phase diagram. We report on the magnetic anisotropy and magnetic phase transitions in single crystal $Tb_5(Si_{2.2}Ge_{1.8})$ by measurements of M-H and M-T along the a, b, and c axes. The variation of $1/\chi$ vs T indicates a transition from paramagnetic to ferromagnetic at T_c = 110 K. Below this transition temperature, M-H curves show strong anisotropy. It is believed this is due to the complex spin configuration. M-H measurements at T = 110 K show that the ***a*** axis is the easy axis, and that the saturation magnetization is 200 emu/g. The *b* axis is the hard axis, which needs an external magnetic field higher than 2 T to saturate the magnetization in that direction, indicating a high magnetocrystalline anisotropy. The c axis is of intermediate hardness. This research was supported by the U.S. Department of Energy under contract number W-7405-ENG-82.

David Jiles
Materials and Engineering Physics Program, Ames Laboratory

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