THERMAL PROPERTIES OF $U_3Al_2Si_3$ SINGLE CRYSTAL

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We report on a detailed study of heat capacity performed on the $U_3Al_2Si_3$ single crystal in the temperature range from $T = 0.15$ K up to $T = 300$ K in magnetic fields up to $\mu_0 H = 5$ T applied along the easy axis of magnetization. Recently $U_3Al_2Si_3$ was reported as ferrimagnet or non–collinear ferromagnet with the Curie temperature $T_c = 38$ K. Magnetic structure is not completely understood at present. Heat capacity measurements performed on polycrystalline and textured samples revealed an enhanced value of the electronic coefficient of specific heat $\gamma = 250$ mJ/mol K^2. The transition to the magnetically ordered state was accompanied by a broad maximum and the heat capacity data below magnetic transition could be fit very well within the model introducing the energy gap Δ in the dispersion relation of magnons. The applied magnetic field shifted the anomaly to higher temperatures and smeared it out. Our results obtained on the single crystal resemble the earlier results obtained on polycrystalline and textured samples. In addition, an upturn of $C/T(T)$ curve, found below $T = 2$ K, can not be fully attributed to nuclear contribution. For the full description of the phonon part of the specific heat we used the harmonic approximation of the phonon spectrum including both the Einstein and Debye models and the correction for an anharmonicity. We made an attempt to separate the contribution of CEF–splitting to the heat capacity.

9.7 cm

13.4 cm

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