PHASE TRANSITIONS IN $TbBaCo_2O_{5.5}$ - SPECIFIC HEAT STUDIES

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Layered cobaltites ($RBaCo_2O_{5+x}$, R = a rare earth ion), promising for application in fuel cells, attract interest because of their intriguing properties, e.g., ionic conductivity and a metal-insulator transition not related to any magnetic ordering. For $TbBaCo_2O_{5.5}$, on cooling from 400 K, there are expected: metal-insulator, para-ferrimagnetic, ferri-antiferromagnetic, Co spin state ordering, and Tb short-range magnetic ordering phase transitions. The studies were aimed at determining orders and courses of these transitions, and investigating specific heat anomalies accompanying them. Specific heat of the single crystal was measured from 2 K to 395 K, in magnetic field up to 9 T. The metal-insulator transition was found to be of the first order and accompanied by an exceptionally high and narrow specific heat maximum, not affected by magnetic field. The two magnetic transitions are accompanied by slight, wide maxima, which smear in magnetic field. There is an indication that the ferrimagnetic-antiferromagnetic phase transition goes through the phase coexistence state. The Co spin state ordering transition is hardly noticeable on the temperature dependence of specific heat. The contribution of Tb ions to the specific heat was noticed as a shallow, Schottky-like, maximum near 3 K.

9.7 cm

13.4 cm

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