Thermal properties of antiferromagnetic zigzag chain system
\(\beta\)-TeVO\(_4\)

Yu. Savina,\(^1\) O. Bludov,\(^1\) V. Pashchenko,\(^1\) S. Gnatchenko,\(^1\) A. Szewczyk,\(^2\) T. Zajarniuk,\(^2\) and M. U. Gutowska\(^2\)

\(^1\)B.I. Verkin Institute for Low Temperature Physics and Engineering, NASU, Kharkiv, Ukraine
\(^2\)Institute of Physics of the Polish Academy of Sciences, Warsaw, Poland

Specific heat of a \(\beta\)-TeVO\(_4\) single crystal was measured by using a PPMS (Quantum Design) in the temperature range 0.1-300 K, in the magnetic field, \(H\), ranging from 0 to 9 T. Both a magnetic and a non-magnetic contribution to the specific heat \(C_P(T)\) of \(\beta\)-TeVO\(_4\) were separated and analyzed. The model of 1D antiferromagnetic Heisenberg \(S=\frac{1}{2}\) spin chains was found to describe satisfactorily the magnetic contribution. Three specific heat anomalies, appearing at \(T = 2.28\pm0.02\), 3.28\pm0.02, and 4.65\pm0.02 K (\(H = 0\) T), have been detected. In order to study the field dependences of these anomalies, \(C_P(T)\) was measured at several fixed values of the magnetic field oriented parallel and perpendicular to the crystallographic \(b\)-axis. As the result, the magnetic \(H-T\) phase diagrams of \(\beta\)-TeVO\(_4\), for \(H\parallel b\) and \(H \perp b\), were constructed.

This work was partly supported by the European Regional Development Fund, through the Innovative Economy Grant POIG.01.01.02-00-108/09.