

Multiple magnetic phase transitions in single-crystalline EuRhGe₃ and EuCoGe₃

O. Bednarchuk¹ and D. Kaczorowski¹

¹*Institute of Low Temperature and Structure Research,
Polish Academy of Sciences, P. O. Box 1410, 50-950 Wrocław, Poland*

Since a few years, europium-based intermetallics have been attracting more and more attention due to their intriguing physical properties with anomalous behaviors in magnetically ordered states. Here, we report on the formation and the bulk physical properties of two tetragonal compounds EuRhGe₃ and EuCoGe₃, studied on high-quality single-crystalline specimens in wide ranges of temperature and external magnetic field. In both materials, the Eu ions are in their divalent state, which gives rise to an antiferromagnetic ordering below $T_N = 11.3$ K and $T_N = 15.4$ K, respectively. In addition, EuCoGe₃ exhibits a successive antiferromagnetic phase transition at $T_2 = 13.4$ K. Based on some characteristic features in the temperature variations of the magnetic susceptibility, specific heat and electrical resistivity, we suggest that in both germanides an amplitude modulated magnetic structure develops below the respective T_N , with the Eu magnetic moments directed along the crystallographic [001] axis in EuCoGe₃ and perpendicular to this direction in EuRhGe₃. The $H - T$ phase diagrams of the two ternaries were found fairly complex, comprising several magnetic phases of basically antiferromagnetic nature.