Evidence of variable range hopping in the Zintl phase $EuIn_2P_2$

T. Toliński,[1] Q. U. Ain,[1] K. Synoradzki,[1] T. Romanova,[2] K. Singh,[2] O. Pavlosiuk,[2] P. Wiśniewski,[2] and D. Kaczorowski[2]

[1] *Institute of Molecular Physics, Polish Academy of Sciences, Poznań, Poland*
[2] *Institute of Low Temperature and Structure Research, Polish Academy of Sciences, Wrocław, Poland*

We report a comprehensive characterization of the magnetic, electrical transport, and thermal properties of single-crystalline Zintl-type material $EuIn_2P_2$. The compound crystalizes with a hexagonal unit cell (space group $P6_3/mmc$) and orders magnetically at $T_C = 24$ K with the Eu magnetic moments aligned ferromagnetically within the *ab* plane but tilted alternately along the *c* direction. The effective and saturation magnetic moments are in good agreement with the theoretical values expected for the Eu^{2+} ion. Above T_C, the transport behavior of $EuIn_2P_2$ is dominated by short-range magnetic interactions, similar to other Zintl phases based on Eu^{2+}, such as $EuIn_2As_2$ [1-3]. The temperature dependence of the electrical resistivity has been modelled in terms of variable-range hopping, inherent in the double-exchange mechanism [4]. Another indication of the latter scenario seems to be the observation for $EuIn_2P_2$ of a quadratic dependence of the negative magnetoresistance on the magnetic field strength and on the scaled magnetization, reported also for $EuIn_2As_2$ [5].

References:

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