The Magnetic Structure of Er_2MgGe_2

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A series of Mg-based germanides, R_2MgGe_2 have been synthesized with the heavy R elements [1]. They crystallize in the tetragonal Mo_2FeB_2-type structure with the P4/mbm space group (#127). The R_2MgGe_2 compounds are antiferromagnets with Néel temperatures ranging from 150 K (R = Gd) to 13 K (R = Sm) [1,2]. However, no sign of magnetic order has been observed for Er_2MgGe_2 and Tm_2MgGe_2 down to 5 K. Electronic structure calculations on Gd_2MgGe_2 suggest that the magnetic order of these compounds might be more complex than a simple collinear antiferromagnetism [2].

In this report, we present our neutron diffraction studies of Er_2MgGe_2 to search for magnetic order and to determine the magnetic structure if order is indeed observed. We find that Er_2MgGe_2 orders antiferromagnetically at ~4 K. At 3 K, the magnetic structure can be described by a propagation vector of k = [½, ½, ¼], with the Er magnetic moments forming a non-collinear antiferromagnetic structure with an intermediate planar arrangement.

[1] Nian-Tzu Suen, P.H. Tobash and S. Bobev, J. Sol. State. Chem., 184, 2941 (2011).
[2] W. Choe, G.J. Miller and E.M. Levin, J. Alloys and Compounds, 329, 121 (2001).