Poster

A previously unnoticed *RE*-*TM*-antimonide: $CeFeSb_3$.

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Intermetallic antimonides containing rare-earth (*RE*) and transition (*TM*) metals show a large variety of compositions and crystal structures. A representative group of such antimonides are compounds of the composition *RETM*Sb_3.

Single crystals of these compounds can be grown in multiple ways. In this study, we used a Bi flux synthesis followed by hot centrifugation, which gives access to a previously unnoticed representative of the iron-containing *RETM*Sb_3 compounds. Single crystals of *RE*$FeSb_3$ with *RE* = Pr, Nd, Sm, Gd, and Tb have previously been investigated [1], while the isostructural Ce-member was newly discovered in this work.

The *RE*$FeSb_3$ crystal structure is shown in Fig. 1. It consists of $^2_\infty[FeSb_2]$ double layers of edge-sharing $FeSb_6$ octahedra alternating with layers of *RE* atoms and slightly distorted $^2_\infty[Sb]$ square layers stacked along [100]. The compounds show metallic conductivity and the layered-type structure gives rise to anisotropic magnetic properties [1]. The combined arrangement of *RE* and iron atoms supposedly enables complex 3*d* and 4*f* electron interactions, which could lead to interesting physical properties.

The *RE*$FeSb_3$ compounds, however, seemingly show anti-ferromagnetic ordering of the *RE* substructure without any contribution of the iron substructure to the magnetic properties. This is supported by the Mössbauer spectra of $CeFeSb_3$ at room temperature and 4.2 K, which are shown in Fig. 2. Both spectra indicate one single iron site exhibiting quadrupole splitting due to an electric field gradient, no static magnetic hyperfine field is detected at low temperatures.

As this phenomenon is poorly understood, the magnetic and transport properties of $CeFeSb_3$ are about to be further investigated.

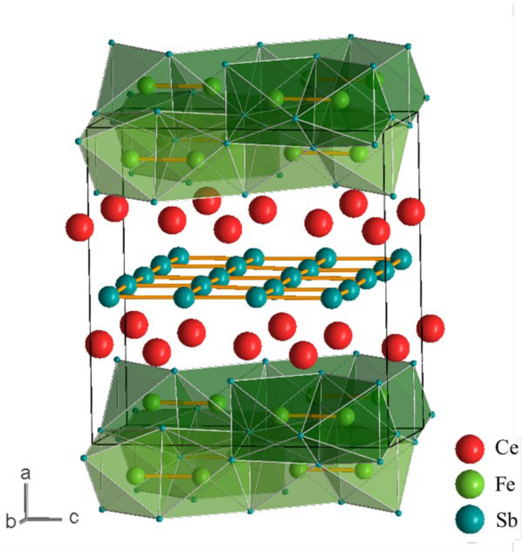

Figure 1. Crystal structure of $CeFeSb_3$.

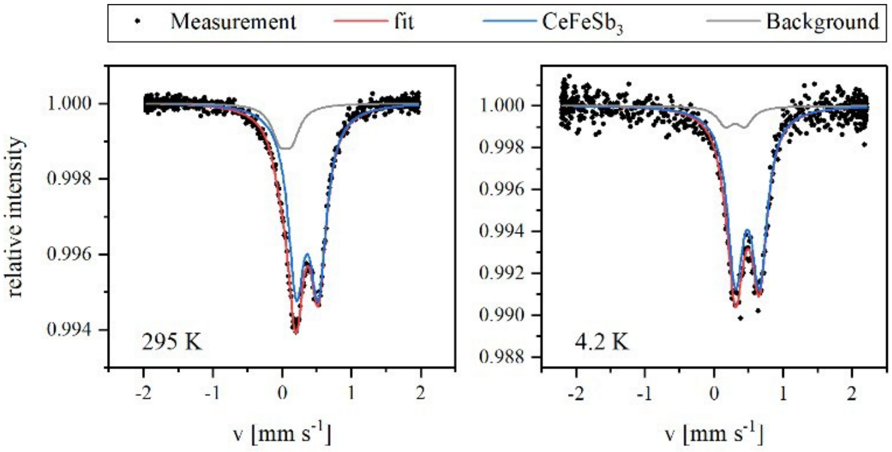

Figure 2. Mössbauer spectra of $CeFeSb_3$ at 295 K and 4.2 K.

[1] W. A. Phelan, G. V. Nguyen, A. B. Karki, D. P. Young & J. Y. Chan, (2010). *Dalton Trans.* **39**, 6403-6409.