Ferromagnetism, superconductivity and temperature-pressure phase diagram of Y_9Co_7

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We will discuss the crystal structures and physical properties of Y_9Co_7 and the related compound Y_8Co_5. In both materials, the crystallographic units consist of trigonal prisms formed by yttrium atoms centered around a cobalt atom. However, superconductivity and ferromagnetism occur only in Y_9Co_7.

Magnetic susceptibility measurements (Arrot's method) on Y_9Co_7 give a Curie temperature T_{Curie} = 4.25K and specific heat measurement provide evidence for bulk superconductivity with T_{SC}= 2.6K and $\Delta C/T_{SC}\gamma \sim 0.9$. The very large residual resistance ratio (RRR=30) confirm the excellent quality of the samples.

We have also extended the temperature-pressure phase diagram of Y_9Co_7 to higher pressure than previously reported. Our new data suggest that applying a sufficiently high pressure (greater than about 3 GPa) completely suppresses ferromagnetism and enhances superconductivity.

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