Hot attraction in bimetals: A cyano-bridged vanadium-niobium bimetal assembly with a Curie temperature of 210 K

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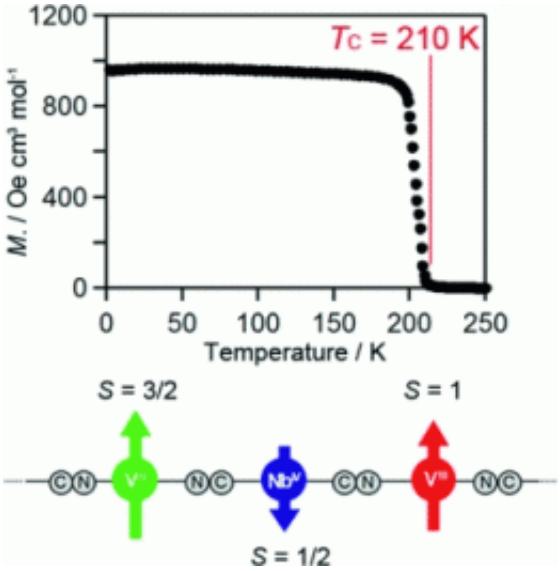

Cyano-bridged bimetal assemblies attract attention because of their magnetic properties such as photomagnetization, humidity-induced magnetization, and nonlinear magneto-optical effect, which make them suitable for many applications. A high Curie temperature is an asset for the use of such magnetic compounds in functional materials. Hexa-, hepta-, and octacyanometalates have been shown to have high Curie temperatures as a result of the high coordination number of their metal centers and the large superexchange interactions due to their diffuse 4d

or 5d orbitals. Shin-ichi Ohkoshi and his co-workers at the University of Tokyo report the compound with the highest Curie temperature among octacyano-bridged bimetal assemblies in the Short Communication published in the *European Journal of Inorganic Chemistry*.

On the basis of initial studies indicating that an increased stoichiometry of vanadium(II) led to a higher Curie temperature in vanadium hexacyanochromate systems, Ohkoshi et al. used a small amount of V^{III} as catalyst to convert a higher proportion of V^{II} in a similar system. The magnetic properties of the resulting octacyano-bridged vanadium–niobium bimetal assembly were investigated. The compound, whose formula was determined to be $K_{0.59}V^{II}_{1.59}V^{III}_{0.41}[Nb^{IV}(CN)_8]\cdot(SO_4)_{0.50}\cdot 6.9H_2O$, is ferrimagnetic, and the spins on V^{II} and V^{III} are antiparallel with respect to the spin on Nb^{IV}. Its Curie temperature is 210 K. This high value is a result of the enhanced superexchange interaction through the V^{II}–NC–Nb^{IV} pathway.

This study reports a strategy to synthesize magnetic materials with high Curie temperature to enhance the suitability of their magnetic properties for applications.

More information: Shin-ichi Ohkoshi, A Cyano-Bridged Vanadium–Niobium Bimetal Assembly Exhibiting a High Curie Temperature of 210 K, *European Journal of Inorganic Chemistry*, dx.doi.org/10.1002/ejic.201101219