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Cyanide-bridged Mn^{II}-Nb^{IV} ferrimagnetic coordination chains with ferromagnetic ordering

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We have synthesized two new coordination chain compounds consisting of manganese(II), 2,2'-bipyridyl and octacyanoniobate(IV), both of them exhibiting ferromagnetic ordering. The first one [Mn^{II}(bpy)(H₂O)₂]_n is isostructural with the manganese-octacyanotungstate vertex-sharing squares chain already reported by Ohkoshi et al. [1], while the second one [Mn^{II}(bpy)(H₂O)₂][Nb(CN)₈]_n shows a topology that has not been observed yet and can be described as a chain of perpendicularly laying squares. Both compounds exhibit antiferromagnetic intrachain interactions within the Nb^{IV}-CN-Mn^{II} structural motifs typical for manganese-octacyanoniobate compounds, but also long-range ferromagnetic ordering (LRFO) below their critical temperatures (*T_c*) of 7.0 and 5.3 K, respectively, which is quite unusual for one-dimensional topology [2,3,4]. This can be explained only on the basis of significant ferromagnetic interchain interactions, which are assured by the interchain π - π contacts of the bipyridine rings and hydrogen bonds between coordination and crystallization water molecules. Additionally, although both chains show great structural similarity, a distinct difference in the octacyanoniobate(IV) geometry is observed, which might have some impact on the magnetic properties.

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[4] Xiangyu Liu et al., Dalton Transactions, 2014, 43, 15359

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