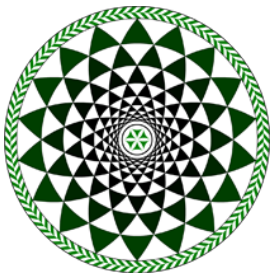

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Influence of a chemical and a structural modification on the magnetic properties of 1D and 2D transition metal thio- and selenocyanato coordination polymers

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Recently, investigations on the synthesis of new magnetic materials like, e.g., single chain magnets (SCMs) has become of increasing interest. This behaviour was already predicted by Glauber in 1963 but experimentally proven for the first time by Caneschi et al. in 2001. Such compounds show a slow relaxation of the magnetization below the so-called blocking temperature and therefore, are able to store a magnetic moment permanently. For the preparation of such materials, usually 1D compounds must be prepared that consist of cations with a large magnetic anisotropy and a high ratio between intra- and interchain interactions.
In our own work we are interested in the synthesis, structures and properties of coordination compounds based on transition metal thio- and selenocyanates and neutral N-donor co-ligands, in which the metal cations are linked by μ-1,3 bridging anionic ligands. Unfortunately for less chalcophilic metal cations like e.g. Mn(II), Fe(II), Co(II) and Ni(II) the terminal N-coordination of the anions is energetically favoured and therefore, the synthesis of the desired compounds is sometimes difficult to achieve. Therefore, we have developed an alternative route for the synthesis of such compounds, which is based on thermal decomposition reactions of suitable precursor compounds. Following our approach, 1D and 2D compounds can selectively be prepared, which also includes the synthesis of polymorphic modifications or different isomers that are thermodynamically metastable at room temperature.
In the course of our project, we have prepared [Co(NCS)₂(pyridine)₂]_n, for which slow relaxations of the magnetization, indicative for SCM behaviour were observed [1]. Starting from this observation systematic investigations on the influence of a chemical and structural modification on the magnetic properties of such compounds and on the parameters that describe the performance of such materials were performed [2-6]. These investigations strongly indicate that obviously a simple class of coordination compounds were discovered, in which the metal cation, the anionic ligand and the neutral co-ligands as well as the dimensionality of the coordination network could be exchanged to some extent without losing the overall magnetic behaviour. Investigations that allow a deeper insight into the magnetic properties of such compounds and that might be helpful for an optimization of such materials.

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