Tuneable Magnetic Co(II)-Containing Layered Double Hydroxides

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Layered Double Hydroxides (LDHs) are composed of the alternating positively-charged mixed metal *M*II-*M*III hydroxide layers and interlayers occupied by anions and crystal water molecules. The metal cations in the layers are coordinated by six oxygen atoms forming 2-D structures of the edge-linked oxygen octahedra. Anions of different nature (either inorganic or organic), size, configuration and charge can be intercalated into the interlayer. As a result, the characteristic layer-interlayer scale in LDHs can be from about 0.7 nm to several nanometers.

Our recent study revealed unusual magnetic behavior of some Co(II)-Al LDHs, particularly an anomalous temperature dependence of their effective magnetic moments [1].

Here we report on the systematic study of magnetic properties of Co(II)-containing LDHs. Layered double hydroxides with the Co(II)/Al cation ratio = 2, 3, and 4 intercalated with different anions were prepared and investigated. Magnetic characteristics and optical spectra of these LDHs were measured and correlated to the cationic composition and the interlayer distance. Magnetic susceptibility was calculated as a function of temperature for different cation ratios and possible distortions of oxygen octahedra. We show that the magnetic characteristics can be reversibly tuned by variation of the interlayer distance through anion exchanges and control of the crystal water content. The obtained LDHs are examples of tuneable nanomagnets and considered as promising models to study magnetic interactions in 2-D systems.

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References

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