Co(II) BASED SINGLE ION MAGNETS AND THEIR ADVANTAGES FOR THE DESIGN OF NEW MAGNETIC MATERIALS

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The structure and magnetic properties of single ion magnets (SIM) related to Co(II) complexes have been considered. Specific features of the structure and magnetic anisotropy of Co complexes with coordination number being , 4, 5, 6, 7, and 8, and the influence of the ligand surrounding on the distortion of Co coordination and slow magnetic molecule relaxation are under consideration.

Particular attention has been paid to the results of experiments and theoretical modeling of hexacoordinated complexes of Co(II) with negative and positive magnetic anisotropy. To analyze magnetic anisotropy of these complexes, additional experimental techniques, such as SQUID magnetometry, Multi High Frequency EPR Spectroscopy, and Far-infrared Magnetic Spectroscopy have been used, as well as theoretical modeling using parametrized Griffith's Hamiltonian with parameters obtained from ab initio calculations. As follows from the analysis, magnetic anisotropy of these complexes is mainly triaxial, with different signs of axial components. Independently on the sign of the axial anisotropy, Co(II) complexes exhibit a slow paramagnetic relaxation in the constant magnetic (DC) field, i.e., belong to the class of field induced non-monoaxial single ion magnets (FI-SIMs). Such type of SIM behavior is due to Kramer's character of Co(II) ion.

Effect of the axial crystal field in quasioctahedral high-spin Co(II) complexes on the rates of direct one-phonon relaxation processes is being discussed. Strongly axially distorted complexes (regardless of the sign of distortion) were shown to exhibit slower relaxation than more symmetric (undistorted) octahedral complexes, this being important to take into account while designing SIMs based on quasi-octahedral Co(II) complexes. Possibility to produce new magnetic materials based on these compounds is being discussed.

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