Relaxation processes in single crystals of $Co(NCS)_2(Ligand)_2$ spin chains

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The $Co(NCS)_2L_2$ compounds, where L denotes a pyridine based ligand, have crystal structures in which spins of Co(II) ions interact through $(NCS)_2$ bridges and create ferromagnetic spin chains. The bulky ligands separate these chains, and such systems behave magnetically as quasi-one dimensional. We will present the study that starts with the description of such systems as XXZ spin chain with almost Ising anisotropy, basing on magnetic and specific heat data, THz-EPR spectroscopy, *ab initio* calculations of electron structure, and DMRG calculations for such a spin chain.
Dynamic susceptibility measurements show that in the ordered phase, these systems demonstrate magnetic relaxations that resemble Single Chain Magnet behaviour. Using micromagnetic Monte Carlo simulations we show that the relaxation signal at zero field originates from defects of the magnetic structure, while at applied suitable field the signal originate from AF/FM domain boundary. The dynamics of both processes is compared. Finally, we will present magnetic data recently obtained for monocrystal samples, where relaxation times are much longer. Close to the critical temperature, a second relaxation process is also observed. The relaxation time of this process is temperature independent, indicating a negligible energy barrier. Such phenomenon was not previously observed for any of the powder samples of $Co(NCS)_2(ligand)_2$ compounds.

References:

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