# Slow Magnetic Relaxation in a S=1/2 copper-based mononuclear complexes

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We have studied the spin dynamics in complexes $Cu(abpt)_2(dca)_2$ and $\{Cu(abpt)_2(dca)_2\}_{0.5}\{Cu(abpt)_2(H_2O)_2(NO_3)_2\}_{0.5}$ (abpt = 4-amino-3,5-di-2-pyridyl-4H-1,2,4-triazole, dca = dicyanamide), which consist of isolated molecules with spin $S = \frac{1}{2}$ with a small antiferromagnetic exchange interaction of -0.4 K.

Measurements of AC susceptibility in the range 0.1–2 T suggest the presence of field-induced slow magnetic relaxation in the copper complexes similar to single-ion magnets [1]. The field and temperature dependence of the relaxation time $\tau$ were extracted from Cole-Cole diagrams. An increase of the relaxation time was observed with the increasing magnetic field up to 1 T followed by its decrease. Such slowing down of the relaxation up to magnetic fields even 3 T was observed in V(IV)-based complexed [2], above which a direct process dominates and the relaxation is accelerated. Subsequently, AC susceptibility was measured over a wide range of temperatures to determine the dynamic properties of the compounds. The magnetic relaxation characteristics obtained in the compound under study indicate an interesting example of the slow magnetic relaxation, where the temperature dependence of the one-phonon direct relaxation process is renormalized under the influence of the phonon-bottleneck (PB) effect.The study of the field dependence and temperature dependence of the sample for different crystallite size allowed to elucidate the origin of the PB effect to be due to the thermal contact between the sample and its surroundings, so-called spatial PB effect. A possibility to suppress the observed PB effect gives the opportunity to extract also the typical frequency of the phonons participating in the Raman process, which is effective at higher temperatures.

**References:**

[1] Boča R., et al., Inorg. Chem. 56 (2017) 1478.

[2] Atzori M., et.al., J. Am. Chem. Soc. 139 (2017), 4338.

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