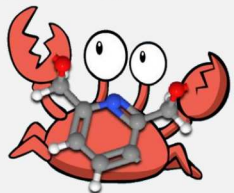


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INTRODUCTION

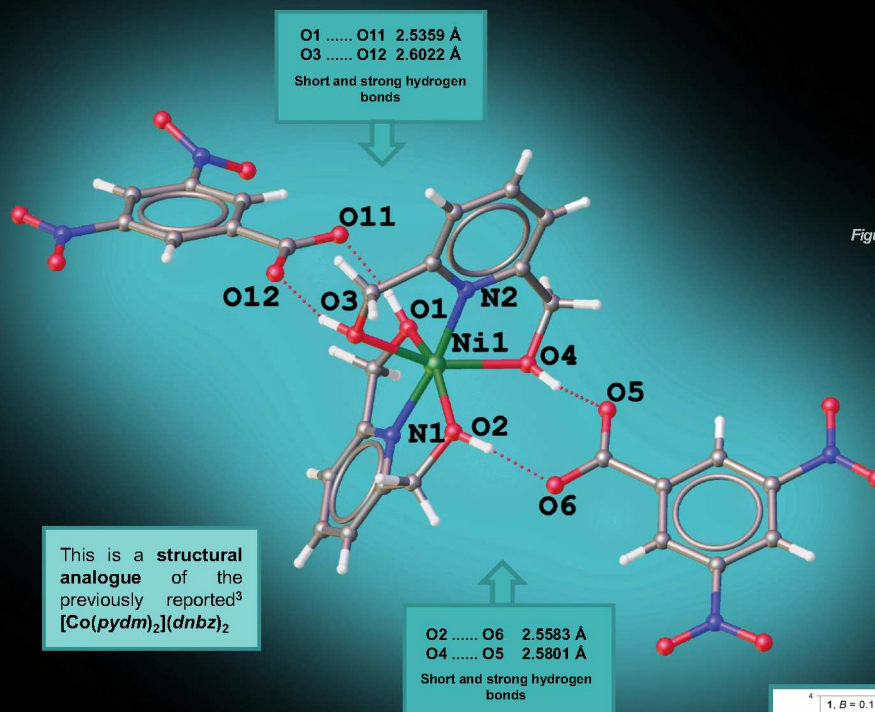
Some complexes of the **first transition metals** are examples of systems showing the field induced slow magnetic relaxation (SMR) as a prerequisite of the **single ion magnets (SIMs)**.^{1,2} While the richest family is represented by Co(II) systems with **two- to eight-coordination**, the SMR/SIM behaviour for Ni(II) systems was confirmed only in a few complexes, e.g. $[\text{Ni}(\text{pydc})(\text{pydm})] \cdot \text{H}_2\text{O}$, $[\text{Ni}(\text{NCS})_2(\text{nqu})_2(\text{H}_2\text{O})_2] \cdot 2\text{nqu}$, and $[\text{Ni}(\text{mdabco})_2\text{Cl}_3]\text{ClO}_4$ (where $\text{pydc} = 2,6$ -pyridinedicarboxylate, $\text{pydm} = 2,6$ -pyridinedimethanol.²



This study is devoted to a mononuclear Ni(II) complex of the composition $[\text{Ni}(\text{pydm})_2](\text{dnbz})_2$ ($\text{pydm} = 2,6$ -pyridinedimethanol, $\text{dnbz} = 3,5$ -dinitrobenzoate (1-)).

CONCLUSION

- All synthesized hexacoordinated complexes exhibited same structural parameters regardless of changed synthesis conditions – change of stoichiometry or solvent.
- X-ray structure analysis (Fig. 1) showed that the basic structural parameters of nickel complex are very similar to those of the cobalt analogue⁴ with composition of $[\text{Ni}(\text{pydm})_2](3,5\text{-dnbz})_2$ and geometry of deformed octahedron.
- A slope reflects some temperature-independent paramagnetism (Fig. 3). The room-temperature value $\mu_{\text{eff}} = 3.49 \mu_B$ gradually decreases on cooling to $T = 15 \text{ K}$ and then it drops to $\mu_{\text{eff}} = 2.34 \mu_B$ at $T = 1.9 \text{ K}$.
- Two relaxation domains are well separated. The low-frequency (LF) relaxation process proceeds at $f \approx 0.15 \text{ Hz}$ which implies the relaxation time $\tau = 1/(2\pi f) \approx 1.1 \text{ s}$.
- Prepared and characterized complex $[\text{Ni}(\text{pydm})_2](3,5\text{-dnbz})_2$ exhibits structural and magnetic characteristics allowing to accept the SMM behaviour.



This is a structural analogue of the previously reported³ $[\text{Co}(\text{pydm})_2](\text{dnbz})_2$

Figure 1. Structure of $[\text{Ni}(\text{pydm})_2](3,5\text{-dnbz})_2$ complex.

ACKNOWLEDGEMENTS

Slovak grant agencies (APVV-14-0078, APVV-14-0073, VEGA 1/0534/16 and FPPV-10-2018) are acknowledged for the financial support.

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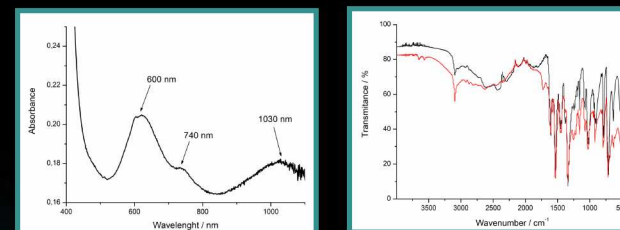


Figure 2. Electron (left) and infrared (right) spectra of $[\text{Ni}(\text{pydm})_2](3,5\text{-dnbz})_2$ compared to cobalt analogue.

Electron spectra of $[\text{Ni}(\text{pydm})_2](3,5\text{-dnbz})_2$ confirmed the existence of a pseudo-octahedral surrounding of the central nickel atom.

Comparison of infrared spectra of $[\text{Ni}(\text{pydm})_2](3,5\text{-dnbz})_2$ (black) and previously reported cobalt analogue (red) indicates isostructural character of both compounds.

The DC magnetic measurements revealed the negative magnetic anisotropy $D/hc = -15.4 \text{ cm}^{-1}$.

At $B_{DC} = 0.8 \text{ T}$ and $T = 1.9 \text{ K}$, the low-frequency (LF) relaxation time is as slow as $\tau(\text{LF}) = 1.3 \text{ s}$, with the mole fraction $x(\text{LF}) = 0.47$.

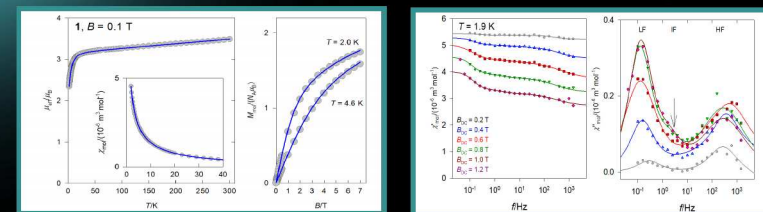


Figure 3. DC magnetic functions fitted by the ZFS model (left), AC susceptibility data – field dependence for $T = 2.0 \text{ K}$ (right).

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