

High-Field EPR Observation of Weak Exchange Interactions in Transition Metal Complexes

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Weak intermolecular exchange interactions often affect the bulk magnetic properties of transition metal complexes and they may be interpreted in terms of the zJ parameter. A few examples were recently observed in HFEPR in which such small interactions result in splitting of the spectral features. This unusual effect makes determination of the exchange interactions magnitude from spectroscopic data possible. Figure 1 presents spectra of a chain complex containing $[\text{Ni}(2,6\text{-bis(pyrazolyl)pyridine})]^{2+}$ moieties bridged by dicyanamide⁻ anions.¹ Groups of five resonances were observed at positions where only one resonance is expected in a monomeric Ni^{2+} system and were interpreted as a result of each Ni^{2+} ion interacting with its two neighbors in the chain. Similar phenomena were observed in a Cr^{4+} chain compounds,² and in an asymmetric copper(II) dimer.

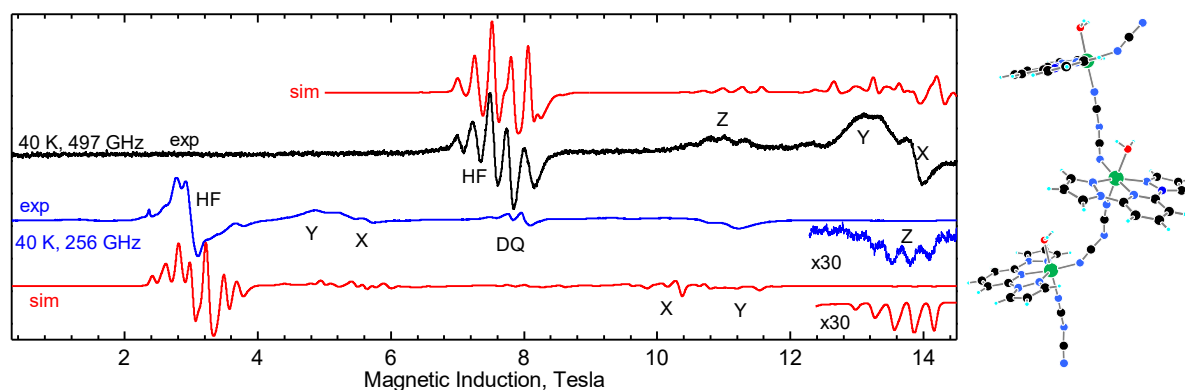


Figure 1. HFEPR spectra of the chain complex $[\text{Ni}(\text{pypz})(\text{dca})(\text{H}_2\text{O})]_n \cdot n(\text{dca})$. X, Y, Z indicate the molecular orientations for the transitions. HF = Half-Field, DQ = Double-Quantum transition.

Acknowledgments. Part of this work was performed at the NHMFL which is supported by the NSF grant DMR-2128556 and by the state of Florida.

References

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- [2] Massado, C. S. N., *et al.*, Chem. Science, **2026**, in press.