HFEPR Studies on New Metallosupramolecular Helicates

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Introduction

Rational synthetic strategies towards complex coordination polymers, metallosupramolecular assemblies, and metal organic frameworks start with the design and synthesis of multitopic organic ligands [1]. In this work, stable metal-containing ligands (Fig. 1) were used as building blocks to construct metallosupramolecular assemblies, mostly helicates, with desirable magnetic and optical properties. Incorporation of the organometallic moieties in building blocks will be useful not only in controlling the shapes of supramolecular building blocks but also in fine tuning the electrical, magnetic, and optical properties of the final materials. The complexes studied here contained in a molecule two Cu^{2+} ions and one lanthanide ion.

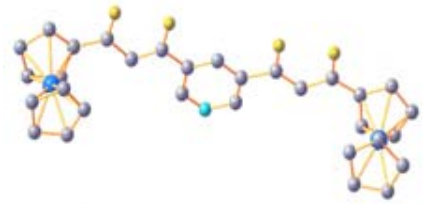

Figure 1. The ferrocene-containing ligand used in this work.

Experimental

High-field and -frequency EPR spectra were recorded on the 15/17 T transmission EPR instrument of the NHMFL EMR facility at frequencies *ca*. 100-619 GHz and at low temperatures.

Results and Discussion

The EPR spectra of all studied complexes exhibited signals due to non-interacting Cu^{2+} ions with $g_x = 2.05$, $g_y = 2.06$, $g_z = 2.28$. In the spectrum of the Cu_2-Er system (Fig. 2), additional signals were observed which were ascribed to Er^{3+} (f^{11}, $^4I_{15/2}$ ground state).

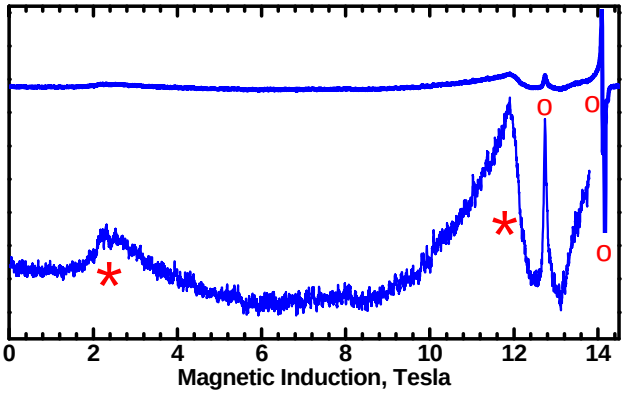

Figure 2. EPR spectrum of the Cu_2Er system recorded at 3 K and 406.4 GHz. Signals marked with asterisks in the magnified spectrum are ascribed to Er^{3+} while those marked with circles are due to Cu^{2+}.

Conclusions

The HFEPR spectra of the examined systems indicate no interactions between two copper ions or between a copper and a lanthanide ion. EPR spectrum due to Er^{3+} seems to have been detected in the Cu_2-Er system which may be an important result. This research is in progress.

Acknowledgements

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References

[1] Raja, M., *et al*., *Organometallics*, **32**, 95-103 (2013).