

ECOLE DOCTORALE DES SCIENCES CHIMIQUES - ED 040

Proposition de sujets de thèse pour la rentrée 2022 / 2023

Titre de la thèse	High T_c Conducting Molecule-based Magnets
Descriptif du sujet (10 lignes maximum)	<p>The quest for high performance magnetic materials is essential to respond to the market demand in information storage as well as in many other domains. Despite their extensive technological use, the current magnets experience several drawbacks, such as high energy consuming fabrication and limited access to key elements. This has led to a sustained effort towards identifying new molecule-based magnetic materials that possess all the features associated with the traditional magnets but benefit from the advantages of molecular chemistry. For instance, molecule-based magnets can be synthesized in mild conditions and their solubility in organic solvents allows for the tuning and post-synthetic modification of their physical properties.</p> <p>The M_3 group at the CRPP has recently demonstrated that the post-modification of a 2D coordination “polymer” $Cr(pyrazine)_2Cl_2$ with reducing agents has led to a new material with very exciting properties. The initial compound shows a ferrimagnetic order at 55 K (<i>Nature Chemistry</i> 2018, <i>10</i>, 1056) and semiconductor properties, whereas the post-modified material is an insulating magnet below 510 K, well above the room temperature (<i>Science</i>, 2020, <i>370</i>, 587). The huge increase of the ordering temperature is explained by the generation of radicals on pyrazine ligands in the 2D network. As a continuation of the work done in the $Cr(pyrazine)_2Cl_2$ system, this PhD project will be devoted to the rational design of new high-T_c conducting magnets using different 2D systems $M(pyrazine)_2X_2$, M being a 3d metal ion and X = I, Br anions or O-based ligands and controlling the post-synthetic reduction.</p>
Compétences souhaitées (nom du DEA, ou MASTER, etc...)	Tout MASTER mention chimie
Financement (connu ou espéré)	Selon les opportunités de financement en cours d'année et l'étudiant intéressé...
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