

STUDY AND CHARACTERIZATION OF MOLECULAR MAGNETS

The project deals with the study of the interactions between metal centers within polynuclear molecular complexes. Polynuclear complexes are multi-functional materials and, among them, those containing copper are particularly interesting due to their multiple properties. Indeed, they can mimic active sites of natural biomolecules, they can interact with DNA, or they can be used as innovative materials in chemistry and in nanotechnologies thanks to their featuring electronic, magnetic, and redox properties.

GOALS

The main goal is to start a systematic study of the magnetic properties of bi- and tri-nuclear copper and nickel complexes. The interest towards these systems arises from the fact that oxygen atoms of specific ligands can act as bridges between copper centers. Since there is a strong relationship between the molecular structure (particularly metal coordination and structure of bridges) and the nature and intensities of the magnetic interactions between unpaired electrons in the metal centers, an accurate choice of organic ligands may induce a direct modulation of the magnetic properties.

INSTRUMENTS AND METHODS

- Development of synthetic strategies for the preparation of polynuclear complexes;
- Structural characterization with X-ray diffraction techniques;
- Study of the magnetic properties via SQUID (Superconducting Quantum Interference Devices);
- EPR spectroscopy;
- Application of theoretical and computational strategies for the appropriate description of the electronic structure and the magnetic properties.

MAIN SUBJECTS

Physical chemistry, Inorganic chemistry, Spectroscopy, Theoretical chemistry

RESEARCH GROUP

Valeria Ferretti
Celestino Angeli

COLLABORATIONS

- Prof. F. Spizzo (Department of Physics and Earth Sciences, UNIFE)
- Prof. C. J. Calzado (Departamento de Química Física, Universidad de Sevilla, Spain)
- Prof. R. P. Sharma (Department of Chemistry, Punjab University, Chandigarh, India)
- Prof. A. Ozarowski (National High Magnetic Field Laboratory, Florida State University, USA)