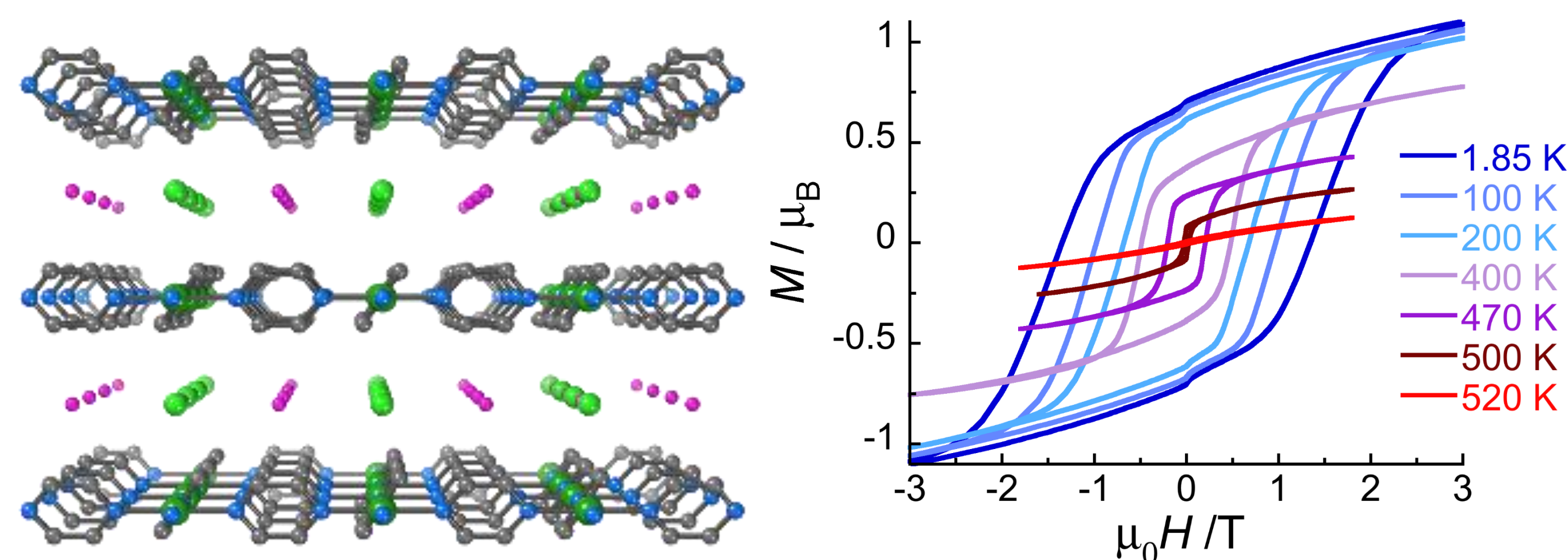


MOLECULAR ENGINEERING

This work reports an efficient synthesis of light weight, molecule-based magnets by postsynthetic reduction of preassembled coordination network that incorporate chromium metal ions and pyrazine building blocks. The resulting metal-organic ferrimagnets feature critical temperatures up to 242°C and a 7500 Oe room-temperature coercivity.

P. Perlepe, I. Oyarzabal, A. Mailman, M. Yquel, M. Platonov, I. Dovgaliuk, M. Rouzières, P. Négrier, D. Mondieig, E. A. Suturina, M.-A. Dourges, S. Bonhommeau, R. A. Musgrave, K. S. Pedersen, D. Chernyshov, F. Wilhelm, A. Rogalev, C. Mathonière, R. Clérac
Metal-organic magnets with large coercivity and ordering temperatures up to 242°C. *Science* **2020**, *370*, 587-592.



@ RODOLPHE CLERAC

SHAPING OF MOLECULAR MATERIALS

This study demonstrates that single-chain magnets (SCMs) can be assembled in gel phase and transferred intact on surface. This is applied to a very unusual self-organization of SCMs into supramolecular tubes of 4.5 nm internal diameter.

F. Houard, G. Cucinotta, T. Guizouarn, Y. Suffren, G. Calvez, C. Daiguebonne, O. Guillou, F. Artzner, M. Mannini, K. Bernot
Metallogels: a novel approach for the nanostructuration of single-chain magnets. *Materials Horizons* **2023**, *10*, 547-555.

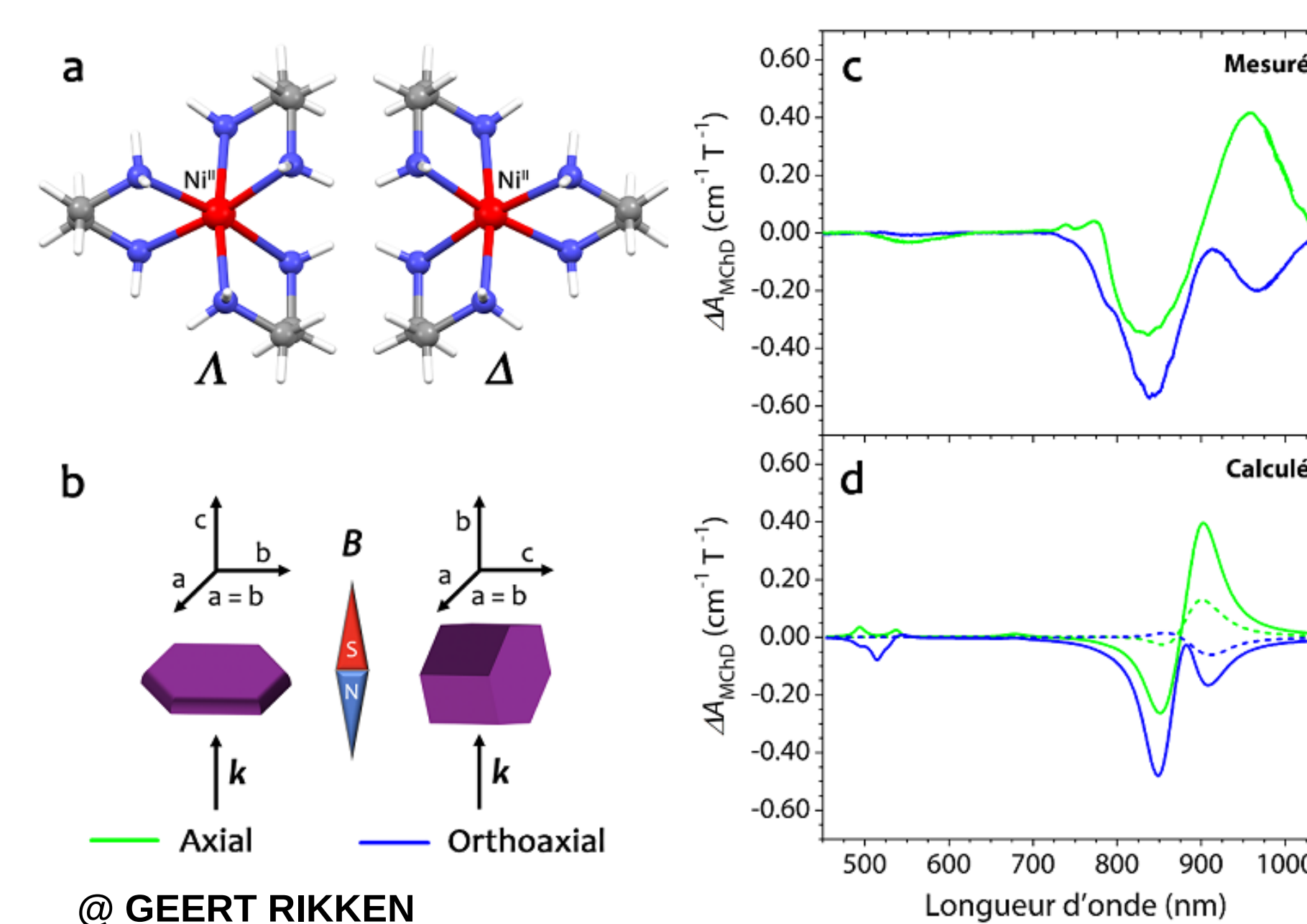


@ KEVIN BERNOT

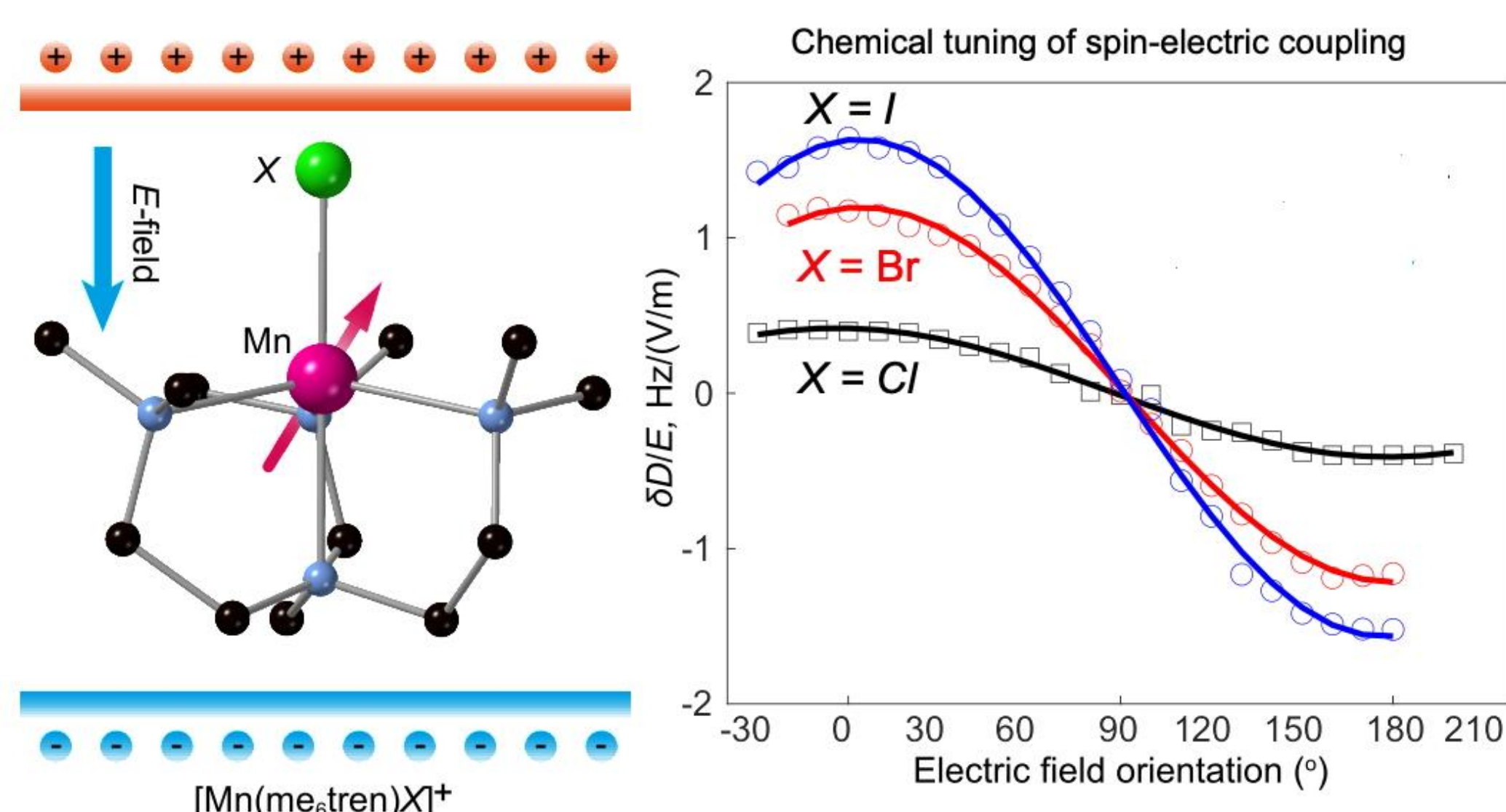
MULTIFUNCTIONALITY AND HYBRID MATERIALS

Switching magnetic field direction and inverting symmetry mirror of molecules plays a role on light propagation and induces an anisotropy called magneto-chiral. Researchers validate for the first time a microscopic theory and evidenced the role of electronic and atomic movements in its intensity.

M. Atzori, H. Ludowieg, M. Cortijo, I. Breslavetz, K. Paillot, P. Rosa, C. Train, J. Autschbach, E. A. Hillard, G. L. J. A. Rikken
Validation of Microscopic Magneto-Chiral Dichroism Theory. *Science Advances*, **2021**, *7*, eabg2859.



@ GEERT RIKKEN



@ TALAL MALLAH

MOLECULAR ELECTRONICS AND SPINTRONICS

Quantum bits can be at the same time in 0 and 1 states. Controlling quantum bits using electric rather than magnetic fields promises substantial architectural advantages for developing quantum technologies. In this context, spins in molecular complexes offer tunability of spin-electric couplings by rational chemical design.

M. V. Vaganov, N. Suaud, F. Lambert, B. Cahier, C. Herrero, R. Guillot, A.-L. Barra, N. Guihéry, T. Mallah, A. Ardavan, J. Liu
Chemical tuning of quantum spin-electric coupling in molecular magnets, *Nature Chemistry* **2025**, 10.1038/s41557-025-01926-5.

MULTI-SCALE AND MULTI-CONSTRAINT INSTRUMENTATION AND THEORETICAL MODELLING

This study shows that atoms can freeze at high temperatures, defying the principles of thermodynamics. The effectiveness of electronic bistability, corresponding here to spin-crossover, as a large source of entropy gain upon warming overcomes the entropy cost of a coupled symmetry breaking, corresponding here to a ferroelastic distortion.

F.J. Valverde-Muñoz, R. Guillermo T. Ramírez, E. Trzop, T. Bataille, N. Daro, D. Denux, P. Guionneau, H. Cailleau, G. Chastanet, B. Le Guennic & E. Collet
Stabilizing low symmetry-based functions of materials at room temperature through isosymmetric electronic bistability, *Materials Horizons* **2025**, *12*, 1463-1472.



@ ERIC COLLET

PhD AWARDS



2025: Aristide Colin

"Design and magnetic behavior of redox-switchable polynuclear complexes", ICMMO, Université Paris-Saclay and University of Tokyo

2024: Pablo Roseiro

"Le rôle des environnements à couche ouverte dans la spectroscopie d'architectures de spin complexes : études fonction d'onde", LCQ and University of Strasbourg

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