Sadiya

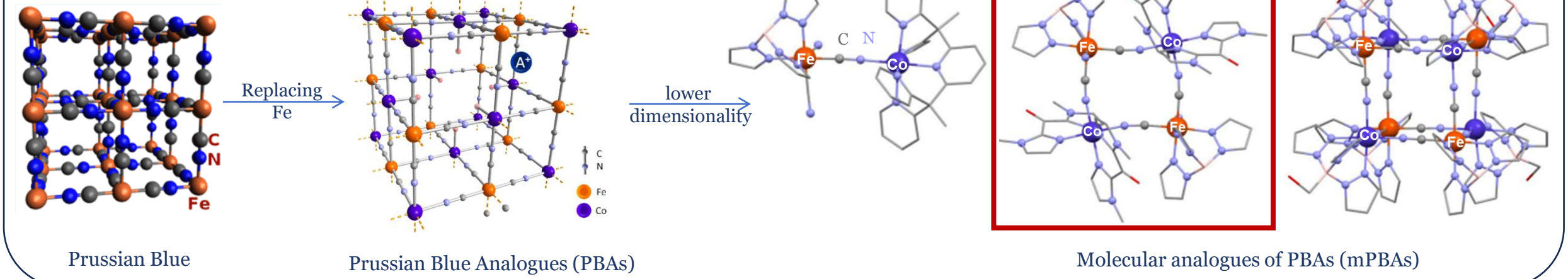
ERMMES Team, IPCM, Sorbonne Université

Pressure-sensitive Molecular Switches

Supervisors:

Dr. Yanling Li, Prof. Rodrigue Lescouëzec & Dr. Volodymyr Malytskyi

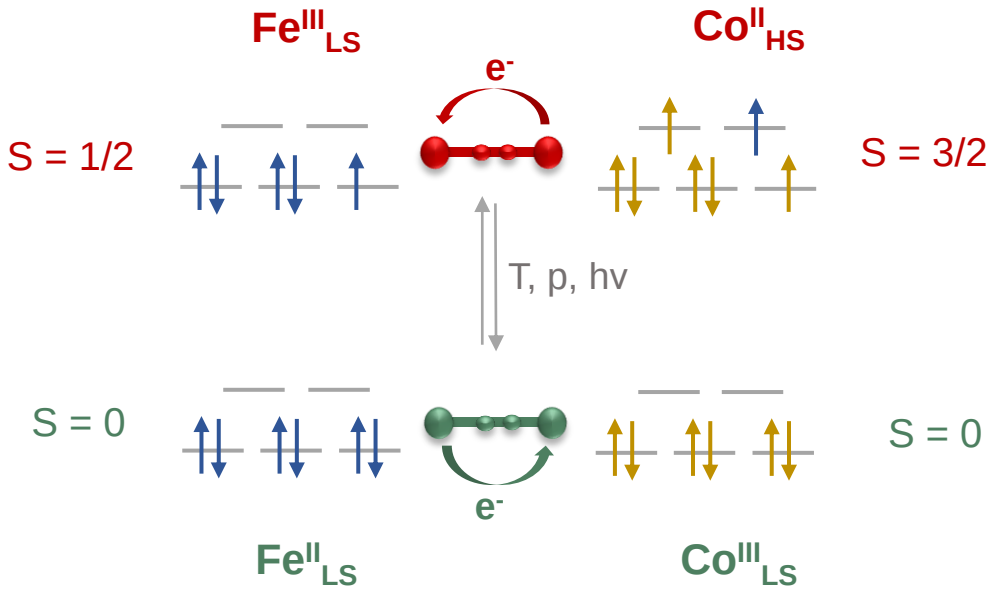
Electron Transfer Coupled Spin-Transition



Prussian Blue

Prussian Blue Analogues (PBAs)

Molecular analogues of PBAs (mPBAs)



Glatz J. et al., *Cord Chem Rev.* **2026**, 549, 217363

Synthesis of Fe_2Co_2 Squares

vbik + $Co(X)_2 6H_2O$ + $[NBu_4][Fe^{III}(Tp)(CN)_3]$

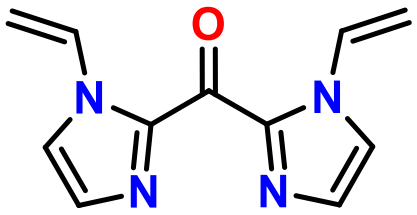
Solvent (S)

S = MeOH, H_2O and CH_2Cl_2

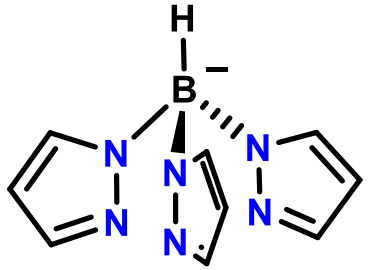
Bidentate ligand

X = BF_4, ClO_4

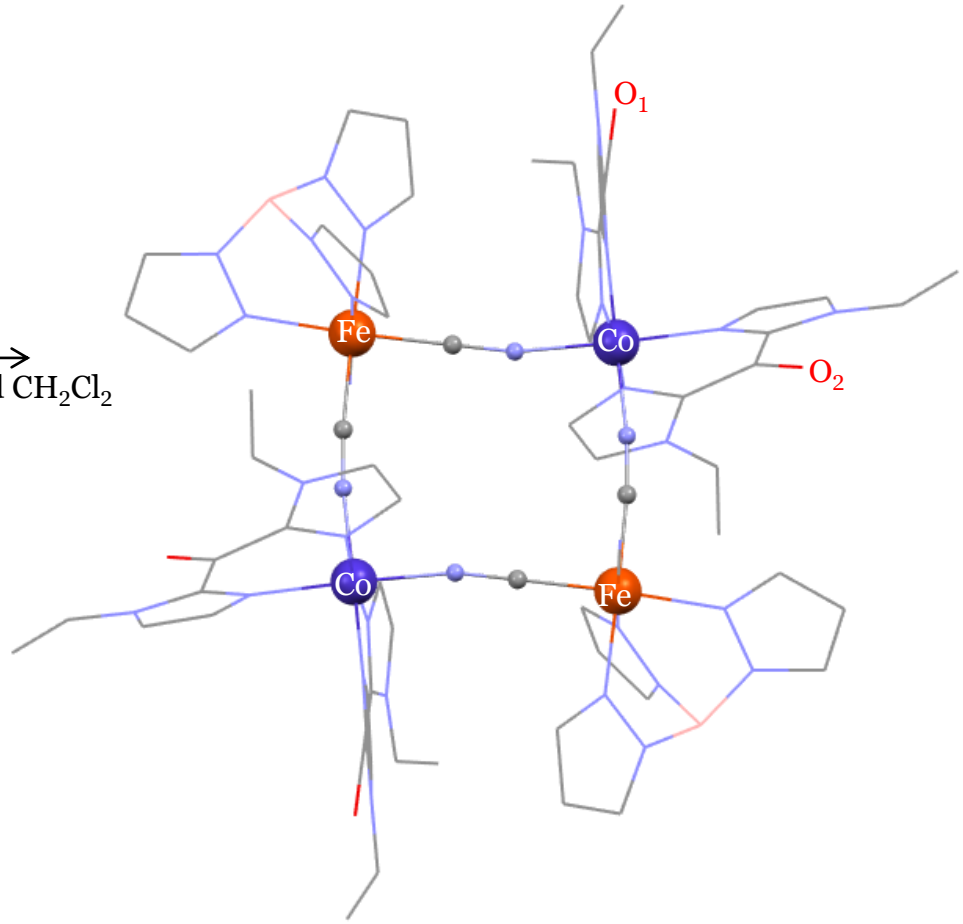
Tridentate ligand



bis(vinylimidazole-2-yl)ketone



Tp ligand
hydro-tris(pyrazolyl)borate



$[Fe(Tp)(CN)_3]_2[Co(vbik)_2]_2 \cdot 2X \cdot 2S$

$[Fe(Tp)(CN)_3]_2[Co(vbik)_2]_2 \cdot 2BF_4 \cdot S$

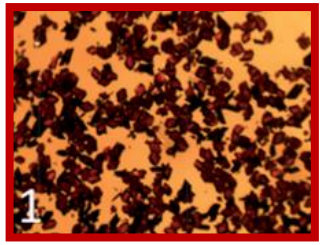
para
Fe^{III}-CN-Co^{II}

Crystallisation 35 °C

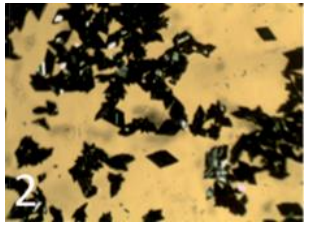
Mother soln. R.T.

dia
Fe^{II}-CN-Co^{III}

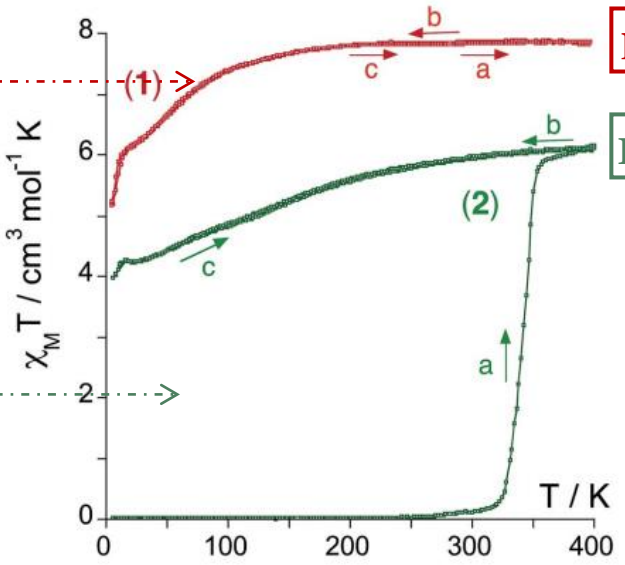
Crystallisation 5 °C



$[Fe^{II}(Tp)(CN)_3]_2[Co^{III}(vbik)_2]_2 \cdot 2BF_4 \cdot 2MeOH$ **(1)**



$[Fe^{III}(Tp)(CN)_3]_2[Co^{II}(vbik)_2]_2 \cdot 2BF_4.12H_2O$ **(2)**



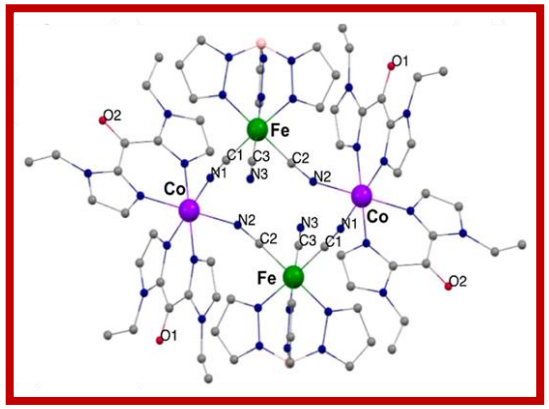
pseudo-para

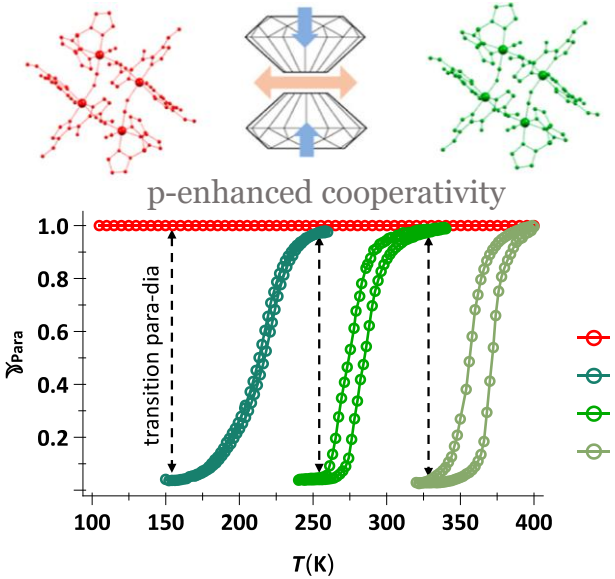
ETCST 330K

-Triclinic space

different crystal packings ->
diff. solid phase interactions

S. De et al., *RSC Adv. 6,* **2016,** 17456–17459





-Complete

-Hysteresis widens with p

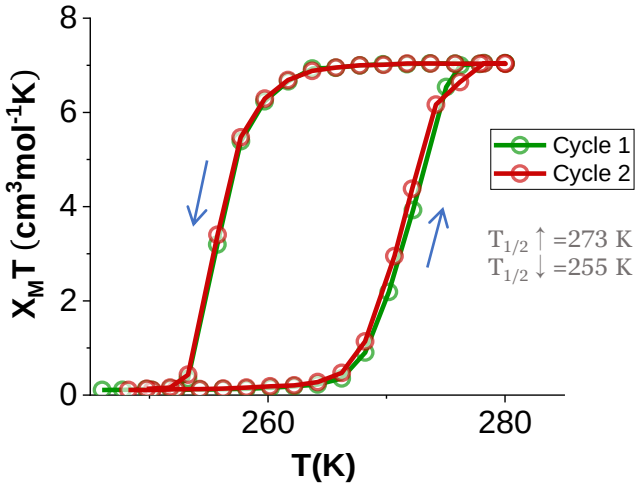
-Anormal Hysteresis

Li Y. et al., *Angew. Chem Int. Ed.,* ***2020,*** *17272-17276*

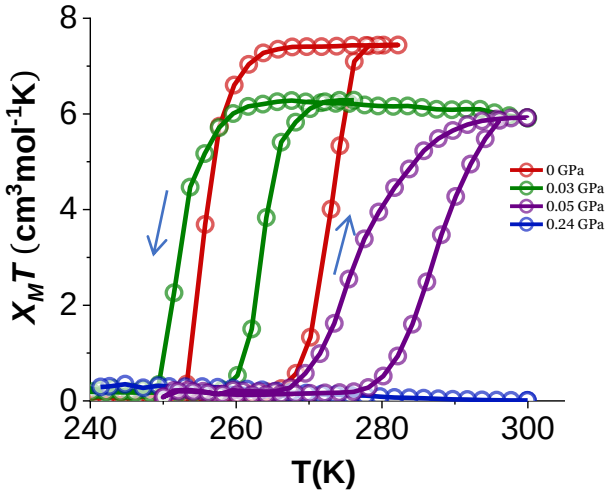
p-studies on Fe_2Co_2 squares

$[Fe(Tp)(CN)_3]_2[Co(vbik)_2]_2 \cdot 2ClO_4 \cdot 2CH_2Cl_2$

i). Thermal ETCST Transition with hysteresis



ii). Magnetic Measurements under Pressure



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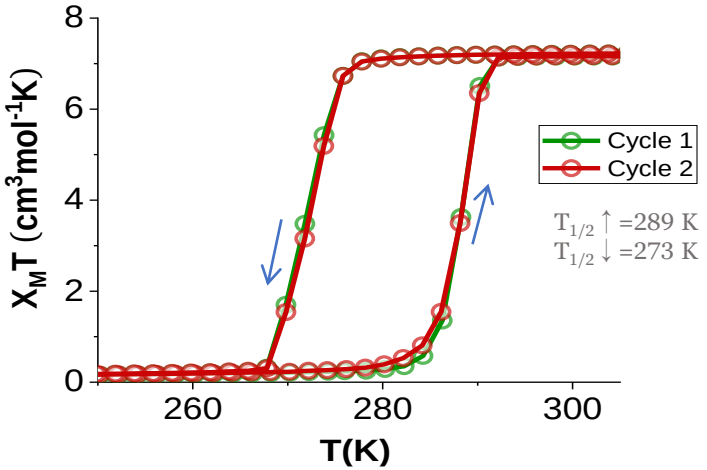

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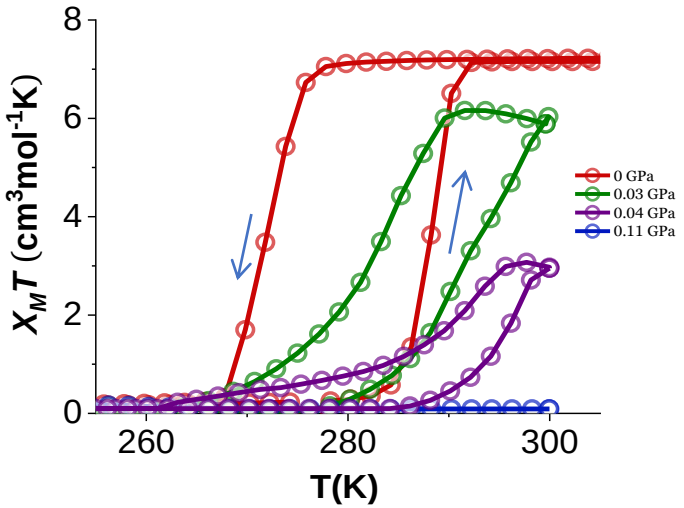

-Two isostructural squares

-Monoclinic space

-Similar crystal packing

-Cooperative Thermal ETCST

Highly Pressure sensitive

Xu B. et al., *J. Am. Chem. Soc.* **2025,** 147, 31, 27506–27514

Acknowledgements

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