

## Internal Seminar

# Influencing Spin States of Mono and Dinuclear Fe(III) Complexes by Chemical Design

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Spin crossover (SCO) is a phenomena where magnetic bistability<sup>1</sup> can be accessed by using external stimuli such as light, temperature, pressure<sup>2</sup> and because of this it has huge potential of use in data storage devices and magnetic switches.<sup>3</sup> Most of the SCO complexes are reported with Fe(II)<sup>4</sup> but they are not air stable as compared to Fe(III) complexes.<sup>5</sup> Air stability is an important factor from the point of view of practical applications. We have prepared several ligands and made Fe(III) complexes, they have shown SCO behaviour around room temperature and in some cases hysteresis loop has also been observed. We have also probed this behaviour with EPR spectroscopy, crystallography and theoretical DFT analysis. All these results and basic introduction of SCO will be discussed in the talk.

### References:

1. (a) Dey, B.; Chandrasekhar, V., 14.11 Organometallic Lanthanide Complexes as Single Molecule Magnets. In Comprehensive Organometallic Chemistry IV, Parkin, G.; Meyer, K.; O'hare, D., Eds. Elsevier: Oxford, 2022; pp 383-417. (b) Brooker, S. Spin crossover with thermal hysteresis: practicalities and lessons learnt. Chem. Soc. Rev. 2015, 44 (10), 2880-2892.
2. Kahn, O. Spin-crossover molecular materials. Curr. Opin. Solid State Mater. Sci. 1996, 1 (4), 547-554.
3. Malavolti, L.; Lanzilotto, V.; Ninova, S.; Poggini, L.; Cimatti, I.; Cortigiani, B.; Margheriti, L.; Chiappe, D.; Otero, E.; Sainctavit, P.; Totti, F.; Cornia, A.; Mannini, M.; Sessoli, R. Magnetic Bistability in a Submonolayer of Sublimated Fe 4 Single-Molecule Magnets. Nano Lett. 2015, 15 (1), 535-541.
4. Dey, B.; Chandrasekhar, V. Fe II spin crossover complexes containing N 4 O 2 donor ligands. Dalton Trans. 2022, 51 (37), 13995-14021.
5. Dey, B.; Mehta, S.; Mondal, A.; Cirera, J.; Colacio, E.; Chandrasekhar, V. Push and Pull Effect of Methoxy and Nitro Groups Modifies the Spin-State Switching Temperature in Fe(III) Complexes. ACS Omega 2022, 7 (43), 39268- 39279.

**Wednesday, Jan 18<sup>th</sup> 2023**

**03:30 PM**

**Seminar Hall, TIFR-H**