

THERMOCHROMIC 2-D COORDINATION POLYMER FLAKES

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Development of novel 2D materials with singular and thrilling properties has aroused large interest due to the novel unexpected applications that can be derived from there. In this sense, coordination polymers (CPs) have appeared as matching candidates thanks to their rational chemical design and the added-value properties given by the presence of metal ions. This is the case of switchable spin-crossover systems that have been proposed as excellent candidates for data storage or sensing, among others. Here we report the delamination of crystals of the 2D spin-crossover (SCO) $\{[\text{Fe}(\text{L}_1)_2](\text{ClO}_4)_2\}_\infty$ (1) CP by liquid-phase exfoliation (LPE) in water. The application of this top-down technique results in the formation of flakes with controlled thicknesses, down to 1–2 nm thick (mostly mono- and bilayer), that retain the chemical composition and the interconversion, both optical and magnetic, of the bulk material. Moreover, these flakes can be handled as stable colloidal dispersions for many days. This allows for a controlled transfer to solid substrates and the formation of thermochromic polymeric films as a proof-of-concept of device. These first results will definitely open new venues and opportunities for the investigation and future integration of these original switchable 2D materials in devices.

References

- [1] S. Suárez-García, N. N. Adarsh, G. Molnár, A. Bousseksou, Y. Garcia, M. M. Dîrtu, J. Saiz-Poseu, R. Robles, P. Ordejón, D. Ruiz-Molina, *ACS Appl. Nano Mater.* **2018**, 1, 2662–2668
 [2] S. Suárez-García, D. Ruiz-Molina 2019, in preparation

Figures

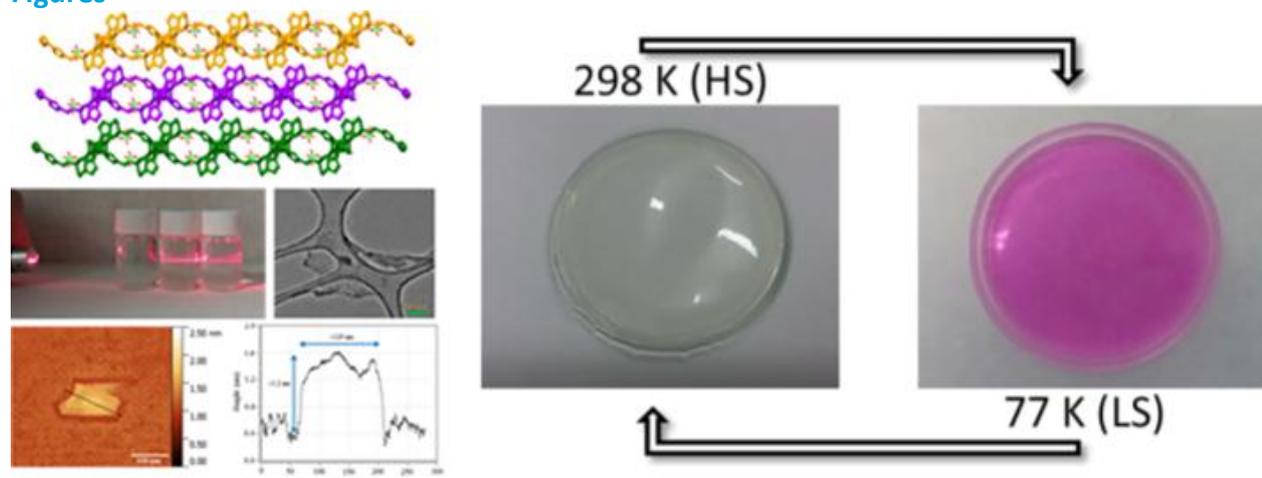


Figure 1: X-ray structure: packing of 2D-corrugated sheets along b axis (adjacent sheets are shown with orange, purple and green); Tyndall effect of the colloidal suspension in water; TEM image of a single isolated corrugated flake; tapping mode AFM topography of the layers on silicon substrate; height profile corresponding to the dashed lines in panel; Variable-temperature dependence of PVA/flakes composites.