Chemical vapour deposition synthesis of MUV-1-Cl magnetic layered coordination polymer and study of the crystal growth process

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The Chemical Vapour Deposition (CVD) technique has been focused by researchers recently as an important tool in the synthesis of layered materials in order to obtain them directly as single or few layered high quality single crystals at large scale and already deposited onto substrates[1]. Using this technique, the aim is the massive production of homogenous 2D molecular magnet crystalline sheets to facilitate their further use in devices and other applications. In this line, coordination polymers have gained the attention of researchers since some of these materials have layered structures[2] and can be obtained in a vapour phase reaction. Furthermore, they are good candidates for applications as, for example, gas sensing or its integration with other 2D materials (for instance 2D superconductors).

Here I will present the development of a CVD synthesis procedure for the synthesis of large thin crystals of a layered iron (II) and 5-chloro-benzimidazolate coordination polymer (MUV-1-Cl). This material has been previously obtained in our group by J. López-Cabrelles in a solvent free reaction under vacuum in a sealed ampoule[3]. The crystals obtained were found to be spin canted antiferromagnets and, interestingly, the surface could be functionalized at will by changing the benzimidazole derivative ligand and, therefore, modifying the surface properties obtaining a whole new family of Layered Coordination Polymers. However, until now, the 2D crystals obtained for this purpose by mechanical exfoliation are not compatible with large scale applications. In order to overcome this limitation, we propose this CVD process in which the production of large and thin 2D crystals (**Figure 1**) has been accomplished and the reaction followed step by step to understand better the growth of these crystals.

REFERENCES

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[3] J. López-Cabrelles et al. Nat. Chem. 10 (2018) 1001-1007

FIGURES

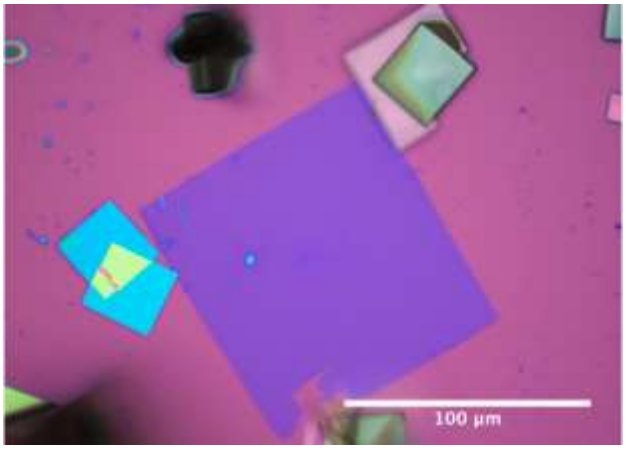

Figure 1: Optical microscope image of a MUV-1-Cl 2D crystal synthesized by CVD.