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Hybrid Spinterfaces for Organic Antiferromagnetic Spintronics

A. Brambilla[1], A. Picone[1], M. Capra[1], A. Giampietri[1], A. Ferretti[1], F. Ciccacci[1], S. Fiori[2], G. Vinai[2], G. Panaccione[2], E. Molteni[3], S. Achilli[3], G. Fratesi[3]

[1] Dipartimento di Fisica, Politecnico di Milano, Milano, Italy

[2] Istituto Officina dei Materiali (IOM)-CNR, Laboratorio TASC, Trieste, Italy

[3] Dipartimento di Fisica "Aldo Pontremoli", Università degli Studi di Milano, Milano, Italy

Contact: alberto.brambilla@polimi.it

Spinterfaces, i.e. interfaces between an organic semiconductor (OS) and a ferromagnetic (FM) substrate, have been raising an ever increasing interest in the last two decades, first through the realization of organic spintronics prototypical devices, then by showing new intriguing phenomena related to the formation of hybridized interface states [1]. As a promising development of the spinterface approach within the rapidly developing fields of *Antiferromagnetic (AF) Spintronics* and *AF Magnonics* [2], we have been extending those concepts to OS/AF interfaces, within an ongoing EU-FET project [3], during which we have been investigating different combinations of AF oxides, in particular Cr_2O_3, NiO and CoO, interfaced to various organic molecules, in particular belonging to the families of Metal-Tetra Phenyl Porphyrins (MTPP; e.g., CoTPP) and Metal Phthalocyanines (MPc; e.g., FePc) [4]. Both kind of molecules are ideal candidates for building spinterfaces, since their ion core can have its own magnetic moment, due to the presence of unpaired spins [5].

Here, we are going to present the concept of our project, where the spinterface represents a true 2D magnetic nanosystem, along with a series of results related to the growth and characterization (including crystalline, morphologic, electronic and magnetic properties) of selected spinterfaces. An example of the surface morphology of a molecular 2D layer of CoTPP on FeO/Fe is reported in the Figure. In many cases, those properties can be compared to computational results based on first-principle theoretical approaches (see, e.g., Ref. 6), which will also be briefly introduced.

References

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Figures

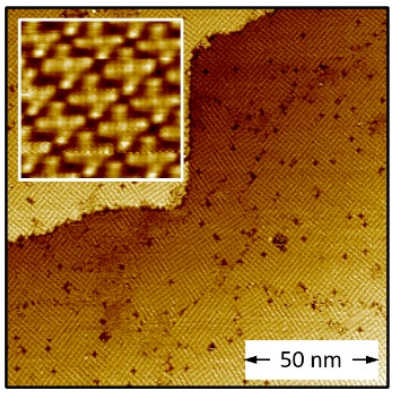

Figure 1: STM image of 1 ML Co-TPP on Fe(001)-*p*(1x1)O. Inset: high resolution scan 5.3x5.3 nm^2.