Title: Slowing down magnetization relaxation of lanthanide phthalocyanine double deckers using a thin oxide film

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Single-molecule magnets (SMMs)[1] including a single trivalent lanthanide ion[2] are attracting much attention due to their large energy barrier for magnetization reversal, opening a path toward potential applications in spintronic devices and high-density data storage[3]. Despite considerable effort to study the properties of SMMs on surfaces[4] knowledge about the interaction mechanisms between SMM and a substrate remains scarce.

We used the high magnetic fields and low temperatures available at the X-Treme beamline of the Swiss Light Source to study the magnetization dynamics of *in-situ* prepared sub-monolayers (ML) of $TbPc_2$ (Pc – phthalocyanine) and $DyPc_2$ molecules on MgO(5 ML) grown epitaxially on Ag(100) by means of x-ray magnetic circular dichroism.

We evidence that the sub-ML of $TbPc_2$ on the MgO surface exhibits a giant three-Tesla wide hysteresis opening with very large remanence at 3 K, outperforming the bulk properties of these molecules and the ones of any other surface adsorbed SMMs.[5] To better understand the role of the oxide film on the magnetic properties of the SMMs we performed a similar experiment with $DyPc_2$ molecules which are known to have significantly faster intrinsic relaxation dynamics than $TbPc_2$. Nevertheless, the sub-ML of DyP_2 on MgO(5 ML)/Ag(100) at 3 K exhibits a large butterfly-shaped hysteresis with an opening up to 1 T, but no remanence is observed.

The studied cases of $TbPc_2$ and $DyPc_2$ on the MgO/Ag(100) substrates suggest a sizable slowdown of magnetization relaxation dynamics induced by the oxide film. During this talk the impact of the oxide surface on the possible magnetization relaxation pathways of SMMs will be discussed along with perspectives toward finding a universal substrate preserving or improving the intrinsic magnetic properties of SMMs.

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