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Coupling TbPc2 single molecule magnets to antiferromagnetic FeMn layers

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38043 Grenoble, France, SEBASTIAN STEPANOW, PIETRO GAMBARDELLA,
ETH, Dept Mat, CH-8093 Zurich, Switzerland — Coupling of single molecule mag-
nets to magnetically ordered (ferromagnetic or antiferromagnetic) layers is a novel
research field that has potential applications in molecular-scale spintronic devices.
In this study we explore the possibility to magnetically couple TbPc2 molecules
to FeMn layers deposited on a Cu (100) substrate. Using X-ray magnetic circular
dichroism we demonstrate that, following field cooling, the out-of-plane Tb magne-
tization loop is vertically shifted and, furthermore, the Tb and Fe magnetization
are antiferromagnetically coupled. Additionally, it is found that the Fe magnetiza-
tion loop is vertically shifted and that this vertical shift depends on the elemental
composition of the FeMn layer. The hysteretic behavior of the Tb magnetization
together with the horizontal shift of the Tb loop are consistent with the hypothesis
that a fraction of the TbPc2 molecules are coupled to the uncompensated Fe spins
through a ligand-mediated superexchange mechanism.

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