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Controlling spins in adsorbed molecules by a chemical switch

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Using X-ray magnetic circular dichroism (XMCD), we present conclusive evidence that the spin of an organometallic molecule coupled to a ferromagnetic substrate can be switched between magnetic off and on states by a chemical stimulus. This is achieved by nitric oxide (NO) functioning as an axial ligand of cobalt(II) tetraphenylporphyrin (CoTPP) ferromagnetically coupled to nickel thin-film (Ni(001)). On NO addition, the coordination sphere of Co is modified and a NO-CoTPP nitrosyl complex is formed, which corresponds to an off state of the Co spin. Thermal dissociation of the NO from the nitrosyl complex restores the on state of the Co spin. The NO-induced reversible off-on switching of surface-adsorbed molecular spins observed here is attributed to a spin trans effect.

Please specify the session

Surface Science, Materials Science, X-ray spectroscopy

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Poster

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