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Bottom-up creation and adsorption of hybrid organic-inorganic magnetic molecules on metal substrates DANIEL WEGNER, RYAN YAMACHIKA, YAYU WANG, MICHAEL F. CROMMIE, Department of Physics, University of California, Berkeley, CA, MARK PEDERSON, Center for Computational Materials Science, Naval Research Laboratory, Washington, DC, BART M. BARTLETT, JEFFREY R. LONG, Department of Chemistry, University of California, Berkeley, CA — Charge-transfer compounds of the type M[TCNE]$_x$ (M: transition-metal, TCNE: tetracyanoethylene) form an important group of molecule-based ferromagnets with potential applications due to their high Curie temperature. Despite extensive studies the origin of magnetic coupling is not well understood due to a lack of sufficient structural characterization, largely attributed to disordered growth. Using a bottom-up approach, we have used a scanning tunneling microscope to arrange single V atoms and TCNE molecules to form charge transfer complexes of different size and geometry. By tunneling spectroscopy we prove chemical bonding as well as the emergence of magnetic properties. Special attention is given to the influence of the metallic substrate on the properties of TCNE and the implications for future organic-inorganic nanoscopic devices.

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