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Magnetic properties of single Ni atoms on Cu2N HENNING PRUESER, TOBY G. GILL, BEN WARNER, CYRUS F. HIRJIBEHEDIN, UCL, UK — When a magnetic atom is placed onto a conducting surface its properties may change considerably due to interactions with the substrate. This interaction may be reduced by introducing a thin decoupling layer between the atom and the underlying metal. One general consequence of placing a magnetic atom on a surface is magnetic anisotropy, where angular momentum along a certain direction is energetically preferred. Although recent studies of atomic scale nanostructures have been able to measure the magnetic anisotropy for atomically precise configurations, a clear understanding of the dramatic differences observed for different atomic spins has not yet emerged. Using scanning tunneling microscopy and spectroscopy, we study the case of single Ni atoms deposited on copper nitride (Cu2N) islands formed in a Cu(001) surface. As in prior studies, we find that the observed magnetic behavior strongly depends on the binding site of the adsorbate. For Ni, however, surprisingly large anisotropy is observed on a nitrogen binding site; this is in stark contrast to the behavior observed for Mn, Fe, and Co, which display evidence of magnetic anisotropy on Cu sites. We explore the possible origins for this behavior as well as the implications for other transition metal adsorbates.

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