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Magnetic Superatoms[1] J. ULISES REVELES, PENEE A. CLAYBORNE, ARTHUR C. REBER, SHIV N. KHANNA, Dept of Physics, Virginia Commonwealth University, KALPATARU PRADHAN, PRASENJIT SEN, Harish-Chandra Research Institute, India, MARK R. PEDERSON, Naval Research Laboratory, Center for Computational Materials Science — The electronic states in metal clusters are grouped in shells much in the same way as in atoms. Filling of the electronic shells leads to stable species called magic numbers. This has led to the proposition that selected stable metal clusters can mimic chemical properties of atoms in the periodic table and can be classified as superatoms. So far the work on superatoms has focused on non-magnetic species. Here, we propose an extension of the superatom concept to magnetic species by invoking systems that have both localized and delocalized electronic states. Here, the localized electrons stabilize spin magnetic moments while filled nearly free electron shells lead to stable superatoms. We demonstrate it for an isolated VCs_8 and a ligated $MnAu_{24}(SH)_{18}$ motifs that are shown to be magnetic superatoms. The magnetic superatoms assemblies offer prospect of tunable molecular electronic devices, as the coupling can be altered by applying fields.

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Shiv Narain Khanna
Department of Physics, Virginia Commonwealth University,
Richmond, VA 23284, USA

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