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A subwavelength magnetic metamolecule FARBOD SHAFIEI, FRANCESCO MONTICONE, KHAI LE, XING-XIANG LIU, THOMAS HARTSFIELD, ANDREA ALU, XIAOQIN LI, University of Texas-Austin — The weakness of magnetism at optical frequencies in nature has led to intense effort to create artificial magnetism, which is at the basis of anomalous refractive properties and other exciting optical phenomena. Plasmonic nanoclusters have been shown to exhibit strong magnetic response because magnetic effects are indistinguishable from spatial dispersion of permittivity at optical frequencies. In a different context, plasmonic Fano resonances have raised great interest, particularly for use in sensing applications that benefit from sharp spectral features and extreme field localization. So far, optical Fano resonances have been based on purely electric effects. In this work, we use an atomic force microscope to assemble a four-particle nanoring consisting of Au nanoparticles of approximately 100 nm in diameter and to actively modify its configuration until we observed the desired spectral response in the total scattering cross section, namely the first magnetic-based optical Fano resonance in a subwavelength metamolecule. Support from ARO, AFOSR, NSF, and ONR are gratefully acknowledged.

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