Quantum dots in strong magnetic fields

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Electron-Hole Duality and Vortex Rings in Quantum Dots

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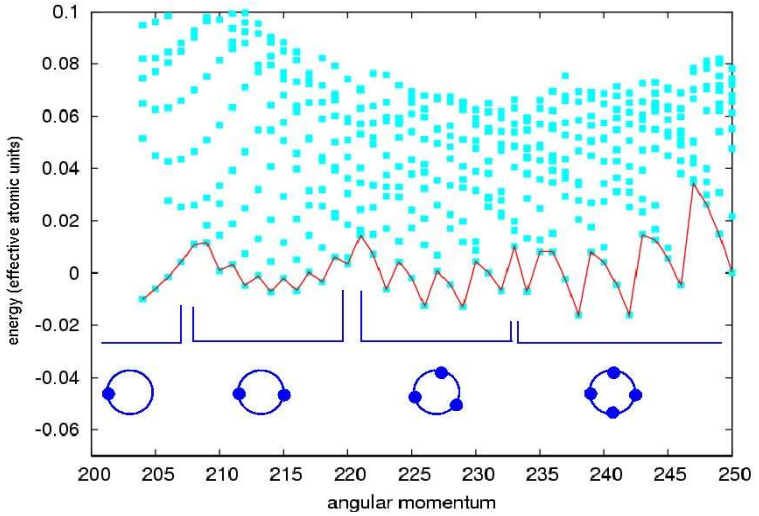
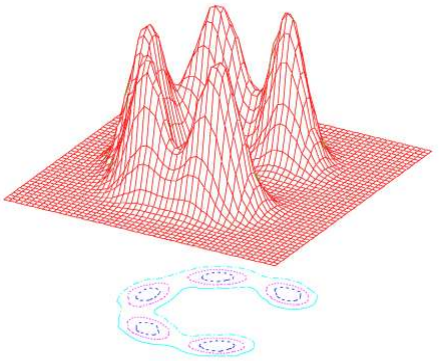
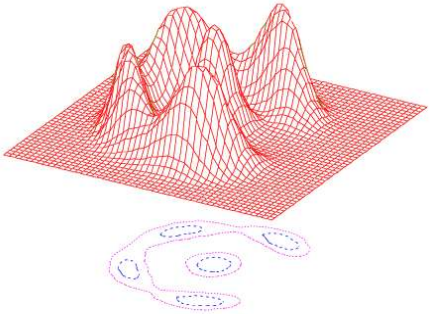


Energy spectrum of 20 electrons in a quantum dot

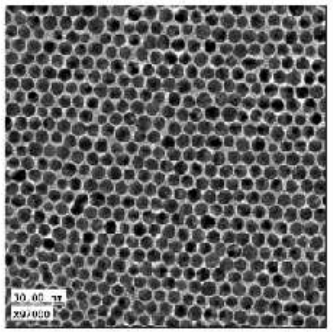


6 vortices (ground state)



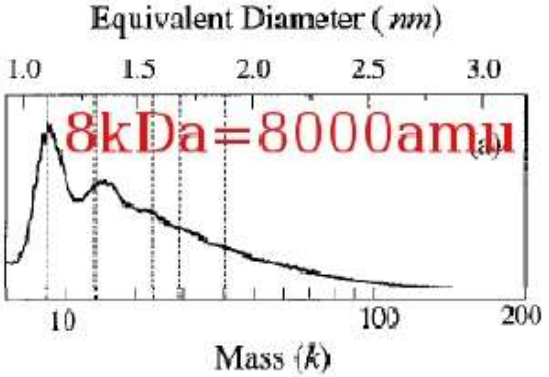
5 vortices (excited state)

Building blocks for nanostructures

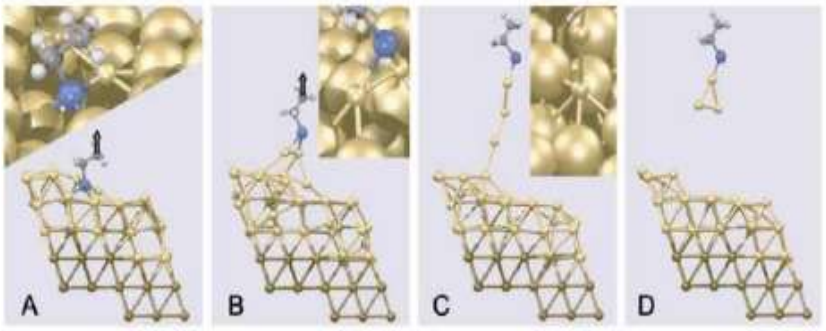


Liljeroth et al, JACS **126** (2004) 7126

Boyen et al, Science **297** (2002) 1534

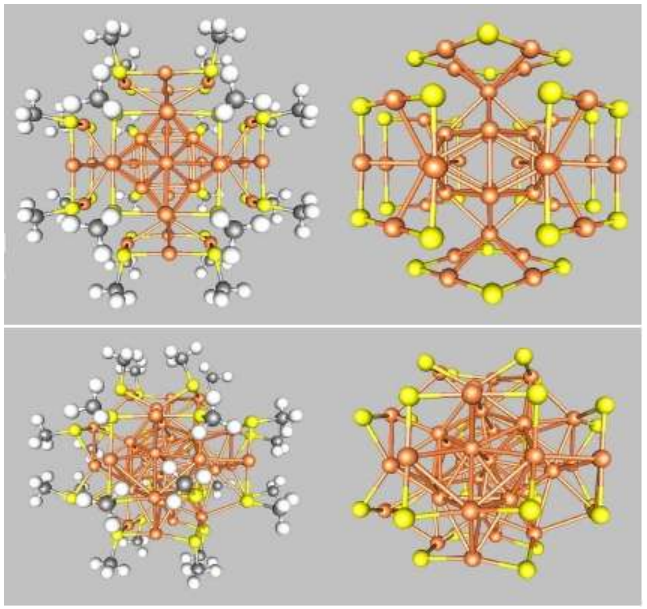


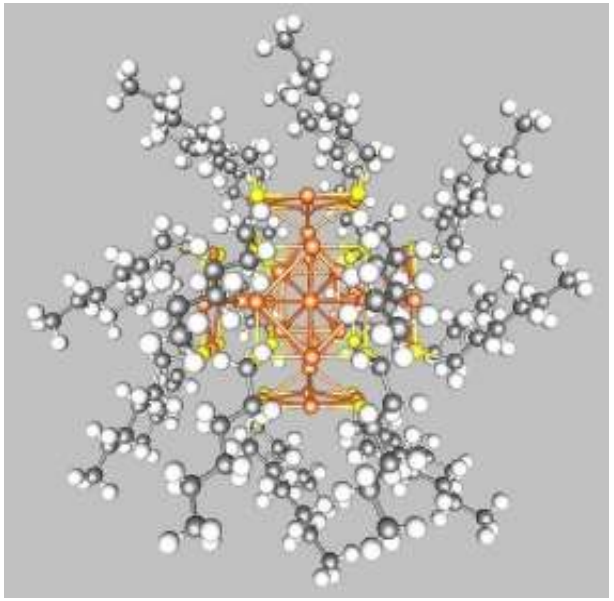
Schaaff et al, JPhysChemB **101** (1997) 7885



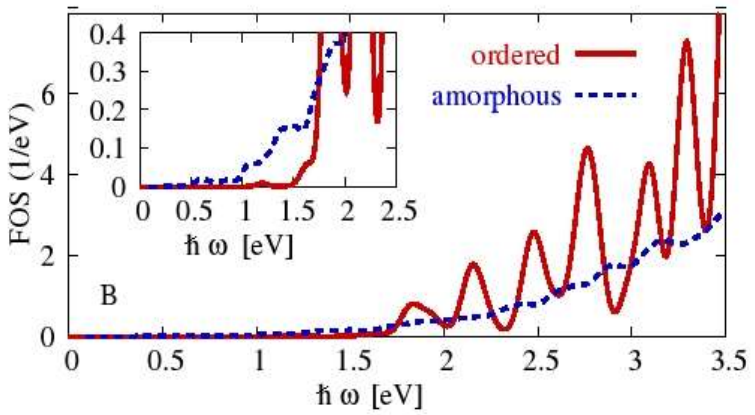
Krüger et al, PRL **89** (2002) 186402

Au-S bond similar strength as Au-Au bond

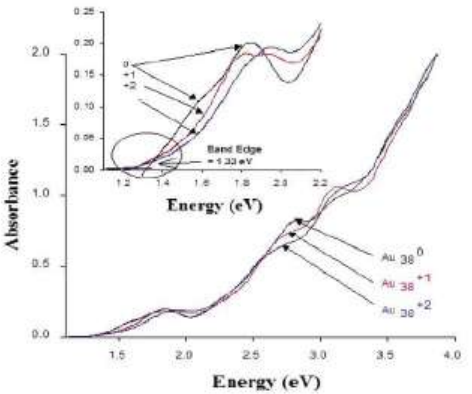




Photoabsorption spectra by TDDFT

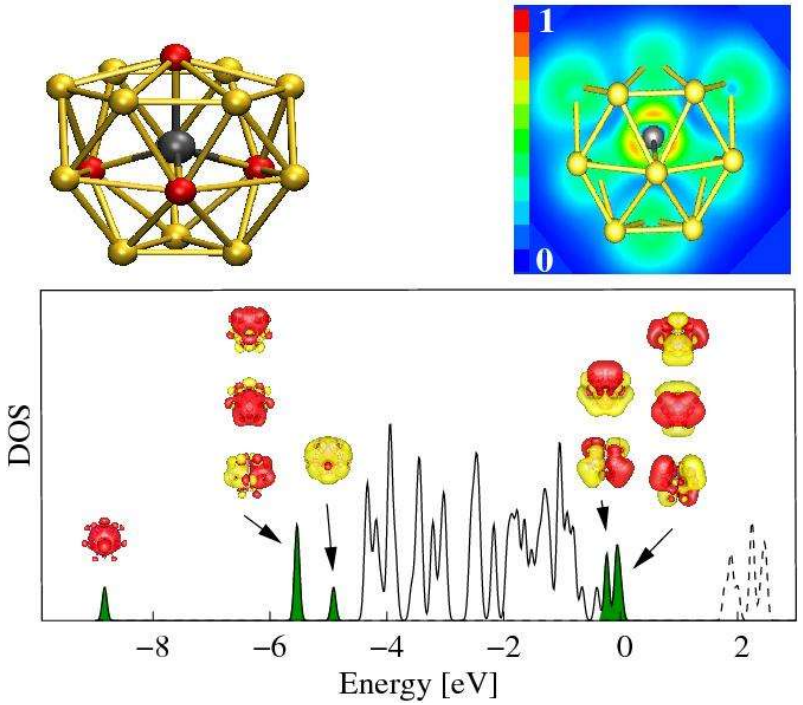


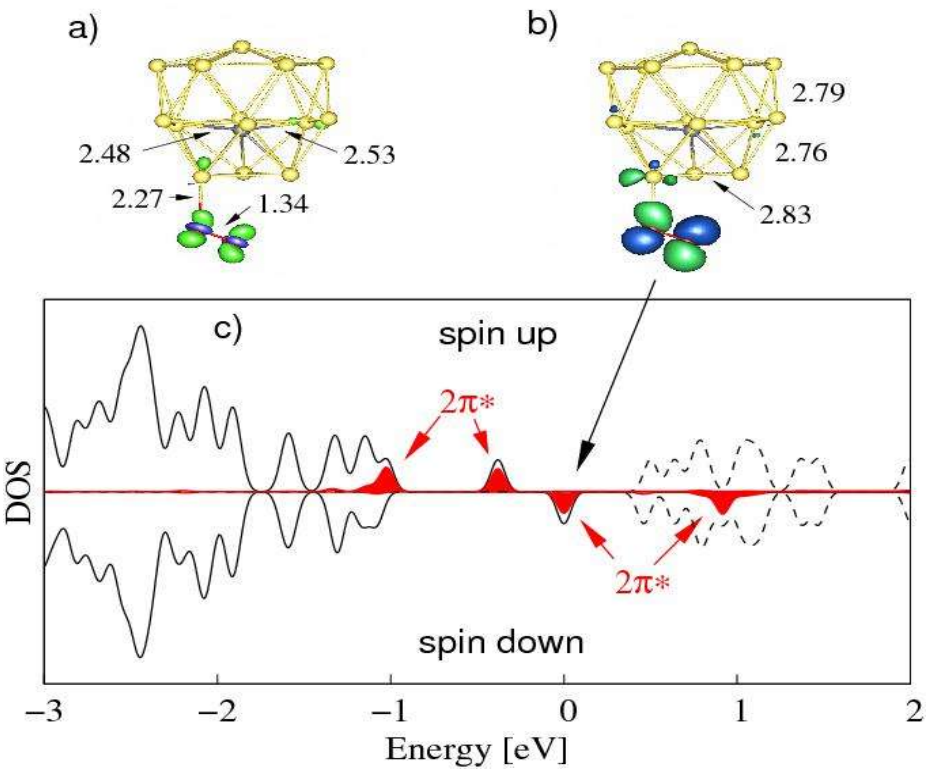
Spectrum of ordered structure is strongly peaked and has a large optical gap (1.5 eV).



Experiment: Jimenez et al, Langmuir **20** (2004) 6864

Tunable reduction/oxidation agent: doped hollow Au_{16}





STM figures

REVIEWS OF MODERN PHYSICS, VOLUME 75, OCTOBER 2003

Theories of scanning probe microscopes at the atomic scale

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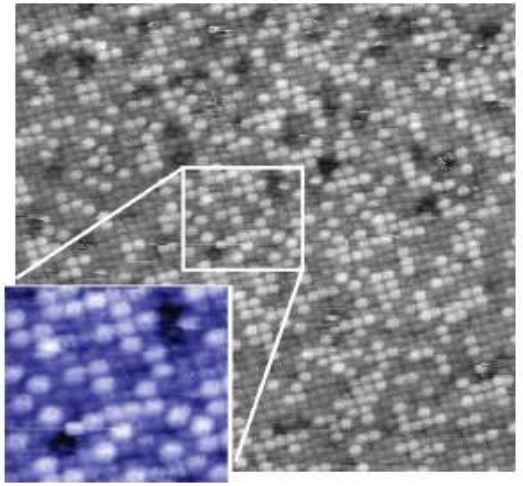
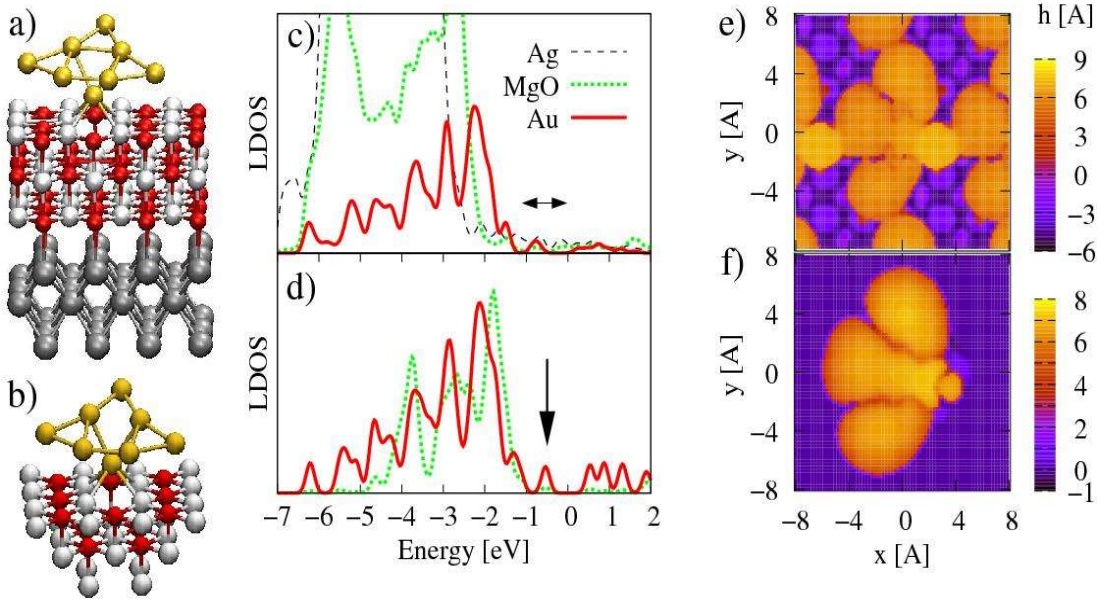
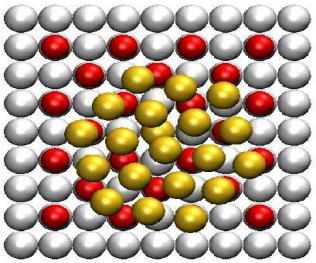
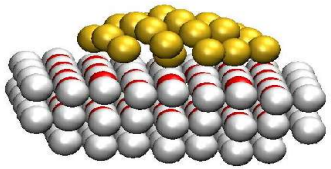


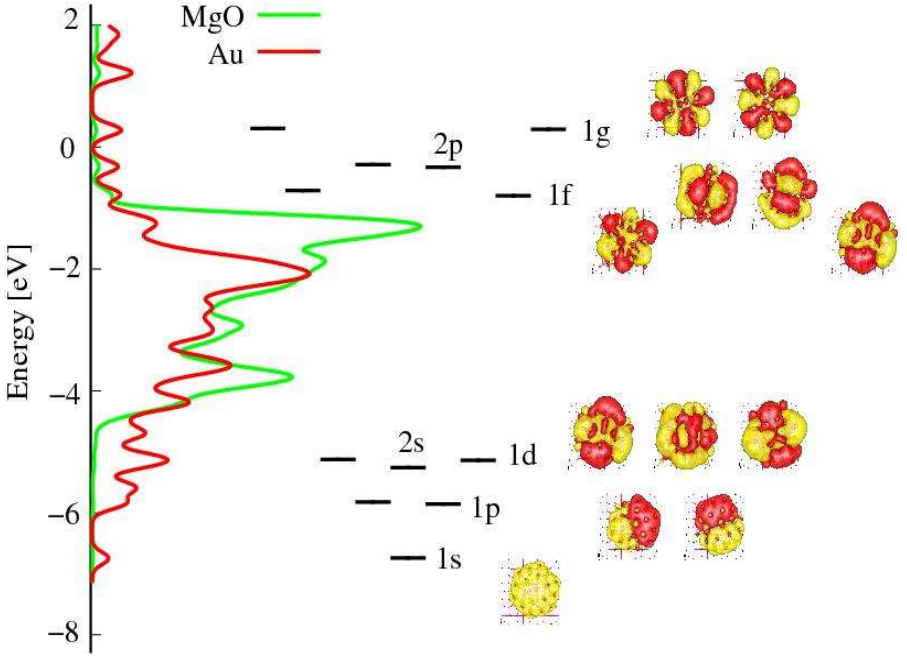
FIG. 8. (Color in online edition) Scanning tunneling microscope scan of a binary PtRh(100) surface. Rh atoms possess a different electronic structure due to alloying with adjacent Pt atoms, they are therefore clearly discriminated by their greater apparent height (see detail). Measurements of this type are the first real-space visualizations of chemical atoms. Reprinted with permission (Wouda *et al.*, 1996).



Au_{20} cluster supported on MgO surface with oxygen vacancy







Simulated STM pictures