

Physics Colloquium

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Molecular and Biological Routes to Future Electronics

The use of molecules as devices and building blocks in electronic circuits has aroused much excitement because of the prospects for realizing molecular-level control of electrical characteristics (by chemical synthesis) and of physical layout (by directed self-assembly). Significant progress is being made in both the systematic study of the electrical behavior of molecular junctions and in the demonstration of molecular self-assembly of prototype nanocomponents. In this talk, I will discuss our study of the electrical behavior of molecular junctions based on nitro-substituted oligo(phenylene-ethynylene) (OPE), a system in which negative differential resistance (NDR) has been reported by numerous groups. We find that NDR in these junctions is a dynamic effect, possibly related to charge storage rather than to resonant tunneling. I will also discuss our use of DNA as a programmable scaffolding for the self-assembly of inorganic nanocomponents. We have used DNA to demonstrate *in situ* assembly, hierarchical assembly, and sequence-encoded assembly of 5-nm Au nanoparticles into regular arrays with spacings as small as 10 nm. Finally, a new project exploiting DNA, protein, and peptide strategies to systematically study physics in metallic nanoparticle systems will be described.

Monday, April 28, 2008
4:10PM Room 55 Roessler