

**Molecular Wires: Fundamental Issues in
Building Devices**

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There has been increasing interest recently in building electronic devices based on the chemical self-assembly of electronically active molecules at electrode surfaces. Recent experiments indicate that there are a variety of molecular structures that exhibit suitable electronic properties for various device functions, including switching, negative differential resistance and memory. A major challenge is how to configure molecules via self-assembly in ultradense electronic circuits that will allow reliable, controlled performance of advanced logic and computation functions. Critical issues include: the type and shape of the molecules, chemical bonding at electrode junctions, molecular alignment, appropriate configurations for single molecule transistors, defect content of molecular ensemble devices and control of chemical interactions and morphology of the top metallized contacts. This talk will discuss these issues and recent work that is aimed towards providing an understanding of the fundamental principles involved.