



Molecular electronics

The field of **molecular electronics** aims to employ the characteristic properties of single, or small groups of, molecules to design electronic components in device-based structures and as such provides a promising alternative to the semiconductor technology which has dominated electronics circuit construction over the past decades. The miniaturization requirements for future devices cannot be met by semiconductors alone since they are reaching ultimate scaling limits in the range of a few nanometers.

The first theoretical model of a molecular device architecture was that of a molecular rectifier as proposed by Arieh Aviram and Mark A. Ratner in 1974. However, due to technological restrictions, many years would pass until this theory could be verified experimentally and further structures could be constructed. After the conductance of a single molecule was measured by Mark Reed in 1997, the design of several, both passive and active, electronic components would follow. This culminated in the label of “Breakthrough of the Year” for molecular electronics by Science magazine in 2001.

In this talk I will discuss the development of molecular electronics and its role in a semiconductor-dominated world of electronics. For applications I will focus on molecular wires and transistors, two elementary components of electronic circuits.

