

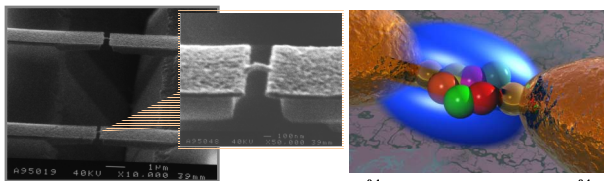


# Molecular Electronics

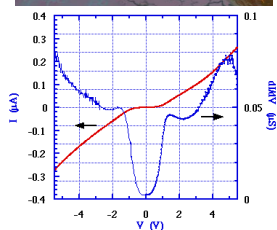
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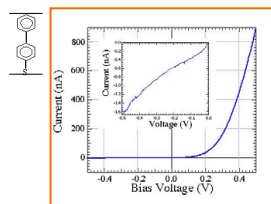
## Break Junction



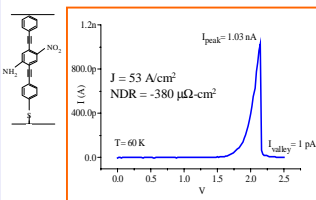
The break junction technique, the historic measurement toward molecular electronics, enabled direct observation of charge transport through single molecule (benzenedithiol) self-assembled onto two gold wires formed by mechanically controllable break junction.



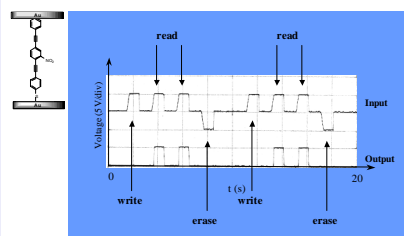
## Molecules As Circuit Elements



**Diode Molecule:**  
 Using the nanopore process and thioacetatebiphenyl SAM we constructed a diode. The prominent rectifying behavior is due to the asymmetry of the molecular heterostructure.

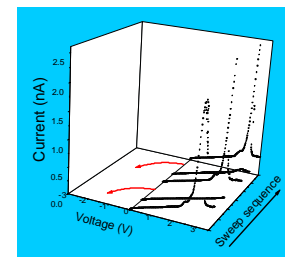
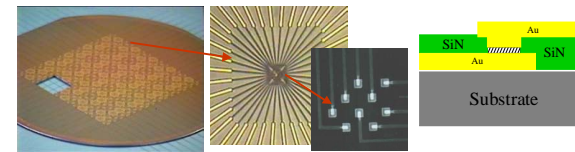


**Switching Molecule:**  
 Using the nanopore process and an amino-nitro-benzenethiolate SAM we have demonstrated negative differential resistance (NDR). This device works as two terminal switches: at a specific applied voltage current will flow (ON) and at all other voltage values current does not flow (OFF).



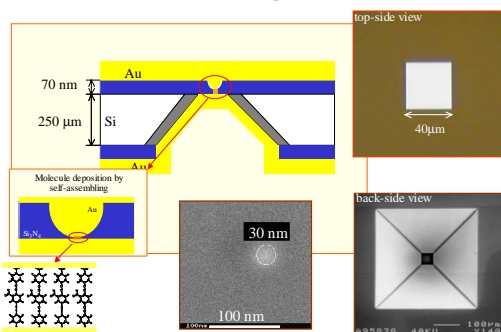
**Memory Molecule:**  
 Using the nanopore process and an nitro-benzenethiolate SAM we have demonstrated a memory cell which can be configured as a RAM (random access memory) at ambient condition. These are two terminal devices that can be toggled between two conductivity states - low and high conductive state ("0" and "1").

## Planar (mesa) Devices



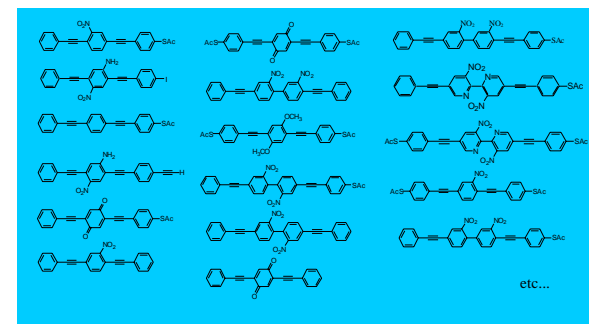
Series of room temperature I-V characteristics of a Au / biphenyldinitro SAM / Au device. 1st sweep shows high conductivity ON-state. The subsequent sweeps show low conductivity OFF-state. After a negative bias, the high conductivity ON-state is recovered.

## Nanopore



Nanopore is a nanoscale metal / self-assembled monolayer (SAM) / metal heterostructure. It provides well defined, stable and reproducible metallic contacts to a SAM within nanoscale area. Nanopore devices of this type are intrinsically stable and allows transport measurements as function of temperature.

## Library of Molecules



Library of molecules that we have been investigating. Molecules of interest have various functional substitutes and end groups which affect molecular properties.

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