



FIRST INTERNATIONAL NANOTECHNOLOGY CONFERENCE ON COMMUNICATION AND COOPERATION

Abstract

Molecular Electronics

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Molecular Electronics - used here in a broad sense encompassing devices, circuit and “technologies” based on molecules, nanoparticles, nanowires and nanotubes- recently raised hopes for the future as a complement or even an alternative to conventional CMOS or IT technology.

Molecular Electronics is increasingly studied as a candidate technology for the following main reasons. First, it inherently deals with the size of molecular objects. Indeed, it is foreseen as a possible answer to the miniaturization problem if those very tiny objects can be assembled into functional systems. Second, it is a natural field for the use of self-assembling techniques. As stressed in the IST-Technology Roadmap for Nanoelectronics, self-assembly, and more generally, bottom-up approaches appear today as the only reasonable way to assemble ultra large numbers of molecular objects into circuits. Moreover, self-assembly is also identified as the most promising way to reduce significantly the fabrication costs compared to what is expected for silicon based devices. Third, Molecular Electronics objects can be used to provide increased functionalities (NEMS, optoelectronics or sensors in particular) to Systems on Chip. Fourth, Molecular Electronics, dealing with objects of inherent quantum nature, is a perfect field for testing and developing new paradigms of architecture, which may prove efficient in terms of energetical cost of computation compared to CMOS.

A critical update of the field will be provided and the main challenges ahead discussed, including the key issue of hybridization to existing and foreseen silicon based technologies.