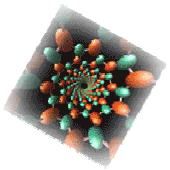

FIRST INTERNATIONAL NANOTECHNOLOGY CONFERENCE
ON COMMUNICATION AND COOPERATION

Abstract

Nanoelectronics: a Technology at the center of change

By reaching, in 2004, the 90nm technology node, the semiconductor industry has made the big step into Nanoelectronics. In this way it has become the first Nanotechnology to reach both mass production and, most likely, the largest share of the world's population.

Nanoelectronics is today at the base of the knowledge society. In itself, it is an industry which, today, has a value of little more than 250 million dollars, but it is the key element which opens the field to the electronics industry, for a value of about 1200 million dollars which, in its turn, enables a widespread service industry, with a value of more than 5000 million dollars. Many of these products and services were not even thinkable of a few decades ago.

But the future of Nanoelectronics and related Nanotechnologies, is not limited to traditional sectors like telecommunications, computer and consumer: its evolution will affect not only on industrial production but also the society, and the quality of life of everyone on this planet.

Especially important will be the role that Nanotechnology can play towards the solution of planet-wide problems related to ecology by introducing new processes and new products that will use less resources and require less power.

One example is the problem of energy supply: today the world is dramatically dependent from fossil fuels, particularly oil. But oil is a major source of pollution, not only because of toxic end products from combustion, but because it promotes the greenhouse effect. Oil is also a major cause of economic and political instability, and could cause fights for oil supply in the next 20-25 years.

Nanotechnology and Nanoelectronics can provide a solution:

- by reducing all forms of energy waste, through a better control of the processes and increasing fuel efficiency;
- by developing new renewable energy sources, especially photovoltaic cells, based on new materials and Nanotechnology. Indeed, with a relatively limited investment of resources in this field, it could be possible to produce photovoltaic energy in large quantities at a cost which could be competitive with the increasing costs of fossil fuels.

Another field in which Nanoelectronics and Nanotechnology are indeed going to play a primary role is that of health and quality of life: all industrial countries and Europe in particular are facing a constant increase in life expectancy, and consequently in the aging of population, and this problem will extend also to other areas of the world, with the improvement of the economical conditions. There is a need not only for improving and supporting the health conditions, but also for insuring an acceptable quality of life to the aging population.

Nanoelectronics can, indeed, help also in these areas: compact, silicon-based lab-on-chips for DNA analysis could be a solution to prevent genetic-related illness, protein analyzers can support diagnosis; while personal medical assistants, can allow elderly people to lead a normal life, by monitoring their main vital signs and keeping constantly in touch with special medical assistance centers.

A third field is smart transportation Access to individual transportation is felt as one major element of individual freedom, but cars are also the source of large problems: traffic jams, pollution, loss of precious time, and above all, thousands of casualties each year in car crashes. Also here Nanotechnology can play a major role in improving the quality of life, by reducing pollution, streamlining traffic and significantly improving road safety.

To achieve these results, it is necessary to allocate to Nanoelectronics the best researchers and adequate resources. From 1997, when investments started to achieve a significant level, to 2004, the total of public investment in research in the field has been around 11 billion dollars. Much larger investments are needed in the future. USA and Japan have increased their investments in the field to meet the challenge, but also other countries are willing to play a role.

Also Europe intends to contribute in developing the science needed to improve the quality of life on our world. More than one year ago, the European Commissioners for Research and Information Society, Mr. Busquin and Mr. Liikanen, put together a High Level Group of industries and research centers, to identify a common research strategy for Nanoelectronics. This activity resulted in a vision document called “Vision 2020: Nanoelectronics at the Center of Change”. Another result was the establishment of an Advisory Council for a Technology Platform on Nanoelectronics, called ENIAC, of which I have the honor of being the Chairman.

The details of the organization of the Platform and the plans for the future will be given in a later presentation, but its main purpose is to coordinate the resources of European Commission, national governments, corporations and research centers, towards the implementation of a common research strategy for Nanoelectronics.

ENIAC is not a closed club. Beside well known European semiconductor companies like Infineon, Philips and STMicroelectronics, and large research centers such as the Fraunhofer Institute, IMEC and LETI, it includes also representative of the major users, and also non-European companies like Freescale, Intel and AMD, with large research and production investments in Europe.

The challenge is global, and Europe is ready to cooperate with research initiatives in Nanotechnology from all other areas of the world, to solve the big challenges that are facing us in the fields of, energy, safety, ecology and health, and to improve the quality of life of future generations.