EuroNanoLab- :
an integration project at European scale for academic nanofabrication centers

Micro- and nanostructures have dramatically changed our environment - although we have not really become aware of that - and will change it further in the years to come. Who remembers the first hard disks of a few megabytes that used to cost a fortune? Today, a hard drive of a few terabytes with a million times higher capacity, able to store a huge library or tens of thousands of hours of music, costs only a hundred euro. Similarly, any person has in his smartphone a computing capacity larger than the capacity of the national supercomputers that were used only thirty years ago. In the field of medicine, nanofluidics make it possible to perform blood tests of unprecedented precision. For instance, NTNU is developing Lab-on-a-chip diagnostic tools to measure very low concentrations of biomarkers in blood in collaboration with SINTEF Digital. The goal is to measure inflammation biomarkers in less than twenty minutes allowing rapid diagnosis of various types of diseases including cancer.

Whether in the field of science, artificial intelligence or big data, tomorrow's intelligent systems will be based on breakthrough innovations such as quantum technologies, which will significantly increase the computing capacity of processors, generalize inviolable encrypted communications or create new high-performance sensors. Transistors at the atomic scale that will achieve ultimate degrees of miniaturization are also within reach, and in the field of medicine, development of nanobiosystems implanted on people and able to monitor in real time their health condition have been proposed.

To develop such applications, innovative components, that rely strongly on advanced nanofabrication technologies, must be designed, fabricated, and tested. Such nanotechnologies require high-level cleanrooms as well as costly equipment, to enable the fabrication with nanometer precision. Given these considerable challenges, the majority of developed countries, particularly the United States and South Korea, invest heavily in research on nanofabrication.

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In Europe, the academic strengths in nanofabrication are still too fragmented: there are at least seventy European university nanofabrication centers of large or medium size, which develop their know-how without any real coordination. Conscious of this dispersion, several European countries (Sweden, France, Norway, The Netherlands) have already created national networks of academic cleanrooms to foster collaboration at the national level. Together with four other countries (Spain, Portugal, Italy and the Czech Republic), these countries have established the EuroNanoLab consortium, which currently includes 26 academic cleanrooms, representing a total value of 1.5 billion euros.

To make better use of the existing investment, EuroNanoLab wants to integrate this academic research infrastructure around a "central hub", which will be its orchestra leader. This new infrastructure will therefore be distributed on a European scale but, nevertheless, be able to develop a common strategy and support major European programs such as the Graphene, Human Brain or Quantum Flagships, as well as future strategic research programs.

Such an organization will enable distribution of the technological developments optimally between the most competent nanofabrication centers. Furthermore, by sharing the technologies EuroNanoLab will ensure that all centers benefit from the latest results obtained by the others. Coordinated by CNRS, and bringing together motivated partners, this initiative is intended to be extended to all European countries ready to contribute. Bringing together the community of academic nanofabrication centers, this new infrastructure will also become a preferred collaborator for technological research organizations (RTO) and their industrial partners. This enables to transfer new know-how, developed by the academic centers, more efficiently to industry.