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EU funds the ICT-FET Integrated Project AtMol to explore Atomic scale and single Molecule logic gate technologies

*The 1st January 2011, the European project AtMol will be officially launched for 4 years. Regrouping the scientific and technological talents of 10 research groups in Europe working together with the IMRE Institute from A*STAR (Singapore), AtMol is to open the atomic scale era of molecular computing integrating state of the art atomic scale technologies, new quantum architectures with multi-scale interconnection and packaging techniques for a single molecule to compute and be packaged into a molecular chip.*

AtMol had already established a detail process flow for fabricating the molecular chip i.e. a single calculating molecule unit connected via external nano-electrodes to preserve its integrity down to the atomic level even after its encapsulation. On a surface, the required logic functions are embedded in a single molecule but can also be implanted within an atomic scale circuit. AtMol will explore and demonstrate how the combination of classical and quantum information inside the same atomic scale circuit increases the computing power of the final intramolecular logic circuit. Atomic scale logics will be constructed using atom-by-atom manipulation, on-surface chemistry, and lab tested using a unique UHV transfer printing technology.

The AtMol research agenda necessitates the state-of-the-art UHV atomic scale interconnection machines comprising, a UHV surface preparation chamber, a UHV transfer printing device, an LT-UHV-STM (or a UHV-NC-AFM) for atomic scale construction, a FIM atomic scale tip apex fabrication device and a multi-probe system with its companion SEM or optical navigation microscope. At the starting of AtMol, only three of such machines exist worldwide and they are each housed within AtMol laboratories (Toulouse, Krakow and Singapore). They will be used to interconnect molecule logic gates one-by-one in a planar atomic scale multi-pad approach on the top, atomically reconstructed, surface of the wafer. For this molecular chip, the back face of the wafer will incorporate nano-to-micro-scale interconnections using nanofabricated vias. The AtMol patented hybrid micro-nano back interconnect approach will enable the full packaging of the molecular chip preserving the surface atomic scale precision of the design.

The AtMol Integrated Project and its related “dissemination & training” activities are going to provide both academic researchers and industry engineers access to the tools needed to be at the forefront of the atomic scale technology revolution, a revolution beyond nanotechnology.

AtMol Partners: CEMES-CNRS (Toulouse, France), LETI-CEA (Grenoble, France), Phantoms Foundation (Madrid, Spain), ICIQ (Tarragona, Spain), CSIC (Barcelona, Spain), Fritz Haber Institute (Berlin, Germany), Humboldt University (Berlin, Germany), Dresden Technical University (Dresden, Germany), Nottingham University (Nottingham, UK), Jagiellonian University (Krakow, Poland), IMRE A*STAR (Singapore)

AtMol WEB site
www.atmol.eu

ICT-FET AMOL-IT proactive program WEB site
http://cordis.europa.eu/fp7/ict/fet-proactive/amolit_en.html

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