

NANOTECHNOLOGY FOR INDUSTRY 4.0

Industry 4.0 is a technological revolution that will fundamentally alter the way we live, since it is mainly based on highly automated smart factories as well as smart products and services. It is anticipated that this revolution will lead to both an economy and society transformation through internet of things, robotics, autonomous vehicles, 3D printing, materials science, biotechnology, energy storage, and nanotechnology. The latter has attracted over the last years enormous research interest in many fields ranging from electronics to automotive industry, chemical industry, energy, textiles, medicine, mechanics, and construction. Understanding and precisely controlling the properties of materials at the nanoscale could indeed lead to innovations that impact nearly every industry. Moreover, the possibility to grow nanomaterials through a low-cost technique such as self-assembly, pose a new paradigm for high-volume cost-effective manufacturing at the nanoscale. Finally, biotechnology, i.e. integration of nanotechnology with biology, has opened the avenues toward the realization of advanced diagnostic devices and drug delivery vehicles for medical applications.

The focus of the proposed session is on the broad areas of nanotechnology and includes, but it is not limited, the following topics: nanomaterials, nanoelectronics devices, non volatile Random Access Memory (RAM), supercapacitors, MEMS/NEMS, nanomedicine, lab on chip devices, nanoenhanced textiles, metamaterials, micro and nano robotics, advanced materials for transportation, smart sensors and probes, directed or programmable self-assembly, colloidal crystals and clusters, self-assembled monolayers, drug delivery, biosensors.

Roberto Macaluso

University of Palermo – DEIM (Department of Energy, Information Engineering and Mathematical models) – Viale delle Scienze – Edificio 9 – 90128 Palermo

roberto.macaluso@unipa.it

Short Curriculum Vitae

Roberto Macaluso is Assistant Professor at the Department of Energy, Information Engineering and Mathematical models (DEIM) at the university of Palermo, Italy. He gained his master degree in Electronic Engineering from the University of Palermo in 1999 and received his Ph.D. degree in Applied Physics from the University of Strathclyde, UK, in 2003. He then moved to Infineon Technologies AG (Corporate Research Photonics), Munich, Germany, working on processing and fabrication of novel laser-modulator devices based on InGaAlAs-InP multi quantum wells structures for data transmission beyond 40 Gbit/s. From 2007 to 2009 he worked at the Department of Physics of Ben Gurion University, Beer Sheva, Israel, as a Marie Curie Fellow, conducting research on fabrication and characterization of carbon nanotubes-based devices for atomchip applications.

His current research interests include design, fabrication and characterization of TiO₂, ZnO and HfO₂-based resistive switching memory devices, pulsed laser deposition (PLD) and characterization of semiconductor oxides and dielectrics for the realization of optoelectronics and electronics devices. He is author or co-author of more than 60 scientific papers published on peerreviewed journals, book chapters, national and international conference proceedings. He serves as referee for outstanding international scientific journals.

He currently teaches Nanoelectronics (Master degree in in Electronics Engineering) and Digital Electronics (Bachelor degree in Electrical Engineering).