

PERSONAL INFORMATION

Giuseppe D'Arrigo



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🌐 https://www.instagram.com/a_jump_into_nanoworld_gd/

male | Date of birth 20/12/1971 | Italian

Enterprise	University	EPR
<input type="checkbox"/> Management Level	<input type="checkbox"/> Full professor	<input checked="" type="checkbox"/> Research Director and 1st level Technologist / First Researcher and 2nd level Technologist
<input type="checkbox"/> Mid-Management Level	<input type="checkbox"/> Associate Professor	<input type="checkbox"/> Level III Researcher and Technologist
<input type="checkbox"/> Employee / worker level	<input type="checkbox"/> Researcher and Technologist of IV, V, VI and VII level / Technical collaborator	<input type="checkbox"/> Researcher and Technologist of IV, V, VI and VII level / Technical collaborator

WORK EXPERIENCE

(2002 - 2007) CNR Researcher III level in a temporary position
 (2008 - 2021) CNR Researcher III level
 (2021 – to present) CNR First Researcher

▪ Main research activities:

Development, fabrication and characterization of nano and micro-scaled structures in Chalcogenide materials in Si, in SiC for applications in the microelectronic, Memory field, power devices.

▪ Laboratory Supervisor Responsibilities:

- 2019 Responsible of Raith 150 Electron Beam Lithography at laboratories of IMM-CNR Catania
- 2019 Responsible of Lab for optical sensor and Phase Change Memory
- 2019 Responsible of ElettroRava Sputtering apparatus at laboratories of IMM-CNR Catania
- 2017 Responsible of ElettroRava Thermal Evaporator at laboratories of IMM-CNR Catania
- 2015 Responsible of CSM Nanoindentation System
- 2008 Responsible of Raith e-Line Electron Beam Lithography
- 2003 responsible of a clean room wet bench for sensor and micromachining application

Business or sector

Semiconductor field: Silicon, Silicon Carbide, Chalcogenide material for memory and photonic application. Devices development and Reliability characterizations.

Research Activities

He started the research activity at CNR-IMM in the field of structural device characterization using Transmission Electron Microscopy with the main objective to spatially investigate doped regions in silicon devices using localized and selective chemical etching. Thanks to the chemical and electro-chemicals acquired skills, He enlarged his research field in the sector of microelectronic and micro-electro-mechanical systems (MEMS). In this sector He explored new methodologies for MEMS systems integration and He was coauthor of several industrial Patents with STMicroelectronics for micro machined structures and for Silicon on Insulator substrate (SOI) fabrication.

In 2007 He became head of the electron beam lithography laboratory at the IMM, dedicating his research activity to the fabrication and characterization of innovative nano-scaled devices. Since 2008 he has been working on Phase Change Materials (PCM), successfully demonstrating the manufacture of Phase Change Memory, using different chalcogenide compositions. The definitive resizing of Phase Change Memory has been successfully achieved using electron beam lithography opening new possibilities for studies of innovative architectures and structural properties

at the nano-scale.

In 2008 He was involved in PRIN project, n. 2008YM2HR5_003 “Calcogenuri innovativi per memorie non volatili: crescita di GeTe, Ge₂Sb₂Te₅ e InGeTe₂, fabbricazione di celle di memoria e caratterizzazione fisico-chimica di film sottili” for PCM cell fabrication and testing under the coordination of Prof. A.L. Lacaita.

Thanks to the acquired competencies on PCM and to the Electron beam nano-fabrication laboratory management He was Scientific Coordinator for the IMM activities of fabrication, testing and modeling of Phase Change Memory cells under 6 years research collaboration contracts between CNR-IMM and Micron Italy (prot. N° 0003181_17/04/2013) and successively between CNR-IMM and Micron Technology Inc. SCOTT DeBoer (prot. N: 0000343_20/01/2015, prot. N: 0002405_05/05/2016, prot.N: 0006367_11/12/2017). The industrial research collaboration activity was focused to the fabrication, testing and characterization of PCM done in several chalcogenide materials and it was pointed out the reliability of the material in terms of element segregation and modeling.

From 2019, He is involved as WP leader for devices fabrication within the European Union’s Horizon 2020 research and innovation program (Grant Agreement No 824957, <http://www.beforehand.eu/>) named BeforeHand. The consortium is formed by 8 partners from 4 European countries (France, Germany, Italy, The Netherlands) and involving academic and industrial partners (Leti and STMicroelectronics) as well.

The project aims at establishing the foundations of new technology, suitable for the implementation in networks of Electronic Smart Systems (ESS) exploiting the capability of phase-change materials (PCMs) to process and store data in the same physical place, with a particular focus on automotive applications. Within the EU project, the realization of processing/storage devices is achieved through the development of new material combinations, made out of phase change materials (PCM), with the best material trade-off benchmarked for automotive applications.

He is WP leader for fabrication and testing in a PRIN (2020) project, named EMPHASIS “NEuroMorPHic devices bASed on chalcogenIde heteroStructures” EMPHASIS (google.com). Aims of the project is the innovative prototyping of neuromorphic devices based on chalcogenide heterostructures. The heterostructures will consist of alternating thin layers of phase-change materials (PCMs) and confinement materials (CMs), such as transition-metal dichalcogenides (TMDs).

He is actually involved as participant in several European Project and Industrial contract, and in particular He is the Scientific Responsible of bi-annual industrial research collaboration contract between IMM and STMicroelectronics of Catania for the development of processes and for the characterization of Si and GaN base power devices (“Sviluppo di processi e caratterizzazioni per dispositivi di potenza in Si-Si/GaN” (Rif.CDR.ST.CNR-IMM.06.10.2021.005).

He is currently in charge of the micro-nano Lab. at IMM hosting several instrumentation for electrical and thermal testing of microelectronic devices and with manufacturing tools as well. In particular the laboratory is equipped with two electron beam lithography systems, e-line Raith (for up to 4 inches wafers processing) and Raith 150 (for up to 8 inches wafers); Mask Aligner MA6 Karl Suss; Elettrovacua Evaporation and Sputtering system for 6” wafers systems; EVG wafer bonding system; AIXTRON CVD and Plasma/CVD reactor for Graphene and Carbon nanotube growth.

He held a “Nano-fabrication” course for UNICT mechanical engineering students during 4 academic years.

He is the author and co-author of more than 100 peer-reviewed articles and more than 10 industrial patents.

He collaborates with many university researcher team of UNICT and UNIME and he was supervisor of about 30 master's degree and doctoral theses.

From 2018, He is member of the program committee of the “European Phase-Change and Ovonic Symposium - E\PCOS” conference.