PhD in Electrical, Electronic and Communication Engineering

Research Title:
Advanced Power Electronic Device Characterization

Funded by	Power Electronics Innovation Center (PEIC)

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Context of the research activity	Electronic Power Conversion is a key element for the development of sustainable modern lifestyle, and represents an interesting field of research with significant impact in different fields of application such as transport electrification, energy, advanced manufacturing. In this framework, the research activity aims at obtaining a deep investigation of power electronic devices related to thermal management. The properties of the semiconductor material have to be optimized in order to minimize power losses and improve cooling capability. A physical model will be implemented and experimental tests will be performed on Silicon and Silicon Carbide based devices. The research work will be carried out in the framework of the Power Electronics Innovation Center (PEIC), a multidisciplinary contest in which different fields and competences (solid state physics, structural and elemental characterization Lab, electrical characterization lab, power circuits).

Objectives	The overall objectives of the activity are: • Development and implementation of new physical models related to thermal resistance of power devices. • Design of experimental test related to thermal resistance of power devices • Advanced material analysis after application models and tests on Si. • Advanced material analysis after application models and tests on SiC. • Testing of SiC devices in real applications as parts of power electronic converters developed by the PEIC, such as

	conductive/wireless battery chargers and inverters for eMobility

Skills and competencies for the development of the activity	Some experience and willingness for laboratory activity • Background in semiconductor materials, devices and characterization methods. • Background in power and/or analog electronics • Teamwork mindset and ability to work in multi-disciplinary environment • Good logical and analysis capability, including good self-organizational mindset • Hardware testing of electronic circuits