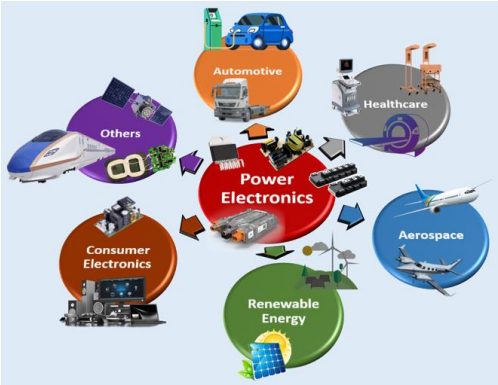
NÉEL INSTITUTE Grenoble

Topic for Master 2 internship – Academic year 2023-2024

Fabrication of gallium oxide power devices

General Scope :



The ecological transition to which more and more countries are committing themselves is driving the microelectronics industry towards sustainability. Based on this trend, the new generation of power devices now incorporates wide-bandgap semiconductor materials such as gallium oxide. They enable the fabrication of devices that can withstand high voltages with low energy losses during operation and overheating. The internship falls within this context and that of the ALOFET project (2024-2028) funded by the French National Research Agency (ANR). The aim of this project is to develop a new architecture of high electron mobility transistors based on gallium oxide, capable of withstanding voltages in excess of one kilovolt. These transistors are used to integrate voltage converters, inverters, choppers, etc. These transistors will be integrated into voltage converters, inverters, choppers, etc., which will then be inserted into electric vehicles, solar panel installations, wind farms, etc... Gallium oxide power devices have the potential to meet the needs of applications covered by SiC and GaN technologies, while opening up new fields of application.

Research topic and facilities available :

The aim of the internship is to manufacture gallium oxide capacitors and diodes. These devices will constitute the first technological building blocks which will then lead to the more accomplished realization of a transistor. To carry out this work, the trainee will have access to the NanoFab cleanroom tools (chemistry bench, lithography, etching, deposition) and morphological, electrical and optical characterization resources of the Néel Institute. The devices will be fabricated from gallium oxide substrates and thin films supplied by the ALOFET project partners (LMGP and PHELIQS). Experimental results obtained on thin films will be compared with structural studies carried out in parallel by other partners (LMGP, MEM).

Possible collaboration and networking :

LMGP (CNRS-Grenoble), PHELIQS (CEA-Grenoble), MEM (CEA-Grenoble)

Possible extension as a PhD :

Yes, the internship can be followed by a thesis.

Required skills:

The candidate must be a master 2 or engineering school student with a good background in physics of semiconductors and devices. Experience in electrical characterization and/or fabrication of microelectronic devices would be an advantage.

Starting date :

February/March 2024 (application deadline due to lengthy administrative procedure: December 2023)

Contact :

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