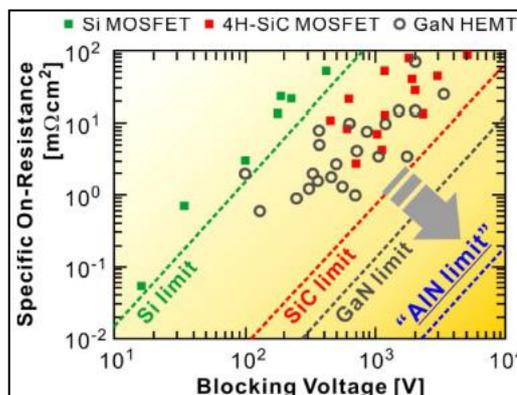


### Study of electronic transport properties in AlN-based power devices

#### General Scope :

This internship takes part of the HBV (High Breakdown Voltage) and ACTION (Novel AlGaN channel transistors for high voltage applications) projects, funded by the French agency “Agence Nationale de la Recherche”. The scope of these projects is to provide leading edge technologies in the field of III-V semiconductor compounds through the development and the improvement of AlGaN-based technologies for high voltage applications (> 1 kV). A high Al content is required to take advantage of the excellent voltage withstand of AlN. However, to achieve strong breakdown fields, material purity and technological steps have to be improved. Thus, a better knowledge of the defects introduced during manufacturing and their impact on the static and in operation performance of the devices is crucial. Control or removal of defects that act as traps will result in a reduction of the trapping effect and therefore a decrease of the leakage current, an increase of the electron mobility and a higher breakdown voltage.



#### Research topic and facilities available :

The aim of the internship is to detect electrically active defects in main layers of the devices by measurements of current-voltage, capacitance-voltage, electrical and optical deep level transient spectroscopies, admittance spectroscopy, etc... These techniques allow the signature, the concentration and the localization of the defects to be determined. Measurements will be done on devices (diodes, transistors, Hall bars, Van Der Pauw structures) provided by the project partners. Along with this work, AlN-based diodes voluntarily contaminated by impurities will be fabricated in the clean room Nanofab of the Néel Institute. The study of these diodes will provide data on the formation and diffusion of defects in Al-rich AlGaN layers.

#### Possible collaboration and networking:

CRHEA (Valbonne) et IEMN (Villeneuve-d'Ascq)

#### Possible extension as a PhD:

Yes if a scholarship from the doctoral school of Physics of Grenoble is obtained

#### Required skills:

The candidate should be a master 2 or engineer school student and should have a good background in physics of semiconductors and devices. Knowledge in electrical characterization of microelectronic devices would be an advantage.

#### Starting date:

February 2023

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