Position: **post-doctoral fellowship at GREMAN (Tours University)**
Starting date: **As soon as possible**
Topic: ***Dopant electrical activity in wide band-gap semiconductors (GaN and ZnO)***

Wide band-gap semiconductors (GaN, SiC, ZnO) are the subject of intensive research and development activities. This growing attention is motivated by attractive mechanical and electrical properties which make silicon carbide, gallium nitride or zinc oxide promising materials for electronic applications. GaN can be heteroepitaxially grown on silicon substrates even though the lattice mismatch is still high. The capability to grow the material on low cost and large diameter silicon substrates becomes then an extremely attractive solution for manufacturing. On the other hand, ZnO is grown using CVD or low temperature techniques (especially Hydrothermal Growth, in our lab) that also lead to large number of defects affecting the electrical activity of the material.
Since many years, GREMAN has developed known-how in dopant activation for industrial applications. In this work, we propose to develop reliable dopant activation evaluation on wide band-gap material. Indeed, for GaN, High Electron Mobility Transistor (HEMT) generally employ junction termination to ensure the maximum blocking voltage. A complete understanding of doped zone (in particular buffer activity on device AlGaN/GaN/Si) has been identified as a crucial issue on both vertical or lateral design. For ZnO nanostructures applied to nanogenerators, the ZnO electrical activity largely affects the behavior of the global device and hence must be clearly understood.
To insure such device realization, electrical characterization is essential. In wide band gap material, the common electrical dopant profiling techniques are not suitable due to its extreme physical properties. However, the availability of 2D reliable dopant profiling is a key tool to understand junction formation and try to avoid failure in devices. The Scanning Capacitance Measurement (SCM) as well as Scanning spreading resistance microscopy (SSRM) are the leading techniques to measure such profiles in wide band-gap materials (here, essentially GaN or related III-N materials). These characterizations are hence a key issue for the development of devices in such materials and will be the aims of the work developed here.
This work will be done in the framework of an ANR Project “GOSIMP” and an European ECSEL JU project called “ENSO” on the CERTeM cooperative platform with STMicroelectronics (in Tours).

Background:
The candidate must have a doctoral degree in material science or microelectronics, ready for team work. Knowledge in semiconductors is essential, especially wide band-gap materials. Background in characterization techniques, in particular AFM, is important for this position. The candidate should have knowledge in AFM classical modes and ideally, an electrical mode (SCM, SSRM, SMiM or C-AFM).

To apply for this position, a CV and a cover letter including date available to start, the names of three references are mandatory.

Contact:
Dr. Kevin NADAUD / Pr. Daniel ALQUIER / Dr. Guylaine POULIN-VITTRANT
GREMAN (STMicroelectronics site)
16 rue Pierre et Marie CURIE
BP 7155
FRANCE 37071 TOURS CEDEX 2
E-mail: kevin.nadaud@univ-tours.fr, daniel.alquier@univ-tours.fr, guylaine.poulin-vittrant@univ-tours.fr