



## *Soutenance de thèse*

*“From nitride nanowires to piezoelectric generation”*

*Nicolas Jamond*

*Mardi 15 Novembre, 15h00*

*Salle R. Planel, bat. D1, C2N site de Marcoussis*

Nitride nanowires are a promising material for the fabrication of efficient and compact piezogenerators. Their tremendous piezoelectric and mechanical properties give them the ability to convert efficiently mechanical energy into electrical energy.

The piezoelectric material studied in this thesis is GaN, synthesised as nanowires by PA-Molecular Beam Epitaxy. Thanks to an adapted AFM résiscope, we show the great potential of nitride nanowires for piezogeneration and the correlation between the polarity of the nanostructure, its deformation and the establishment of the piezopotential.

We also study the harvesting efficiency of the nanostructures' polarization, through a nanometric Schottky contact. Due to scale effects, this Schottky nanocontact shows a reduced barrier height and resistance, which lead to an enhanced conduction and thus to a better harvesting of the piezoelectric energy generated by the GaN nanowires.

Based on the understanding of those mechanisms, we have built a piezogenerator integrating a vertical array of p-type GaN nanowires, embedded in HSQ resist and with their top connected by a Pt metallic electrode, leading to a Schottky contact. This prototype delivered a power density of about 12,7 mW.cm<sup>-3</sup>, which is the state of the art for GaN nanowires based piezogenerator.

### **Composition du jury :**

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