

**Sujet thèse / PhD subject 2024**

<b>Titre Thèse</b>	Design and fabrication of Nitrogen-polar III-Nitrides HEMTs on silicon for RF applications	
<b>(Co)-Directeur</b>	Farid Medjdoub	E-mail : <a href="mailto:farid.medjdoub@iemn.fr">farid.medjdoub@iemn.fr</a>
<b>(Co)-Directeur</b>		E-mail :
<b>(Co)-Encadrant (s)</b>		E-mail :
<b>Laboratoire</b>	IEMN	Web :
<b>Groupe(s)</b>	WIND	Web :
<b>Projet phare (principal)</b>		
<b>Demande thèse labellisée IEMN</b>	Non	
<b>Financement demandé</b>	Contrat Doctoral Etablissement	ULille <input type="checkbox"/> Centrale Lille <input type="checkbox"/> JUNIA <input type="checkbox"/>
	Région – Autre <input checked="" type="checkbox"/> Préciser : ANR PRC	Co financement (Préciser l'origine, demande en cours, acquis ou pas) :
<b>Financement acquis</b> <input type="checkbox"/> <b>Financement partiellement acquis</b> <input type="checkbox"/>	Contrats de Recherche <input type="checkbox"/> Préciser :	Autre <input type="checkbox"/> Préciser :

**Résumé du sujet :**

This thesis is targeting the development of Nitrogen-Polar III-Nitrides on silicon substrates using Molecular Beam Epitaxy. N-polar III-Nitrides will be achieved by polarity inversion using a thin epitaxial metallic layer of Niobium Nitride (NbN). Polarity inversion, more specifically from metal-polar to nitrogen-polar, using this approach has been recently demonstrated. The work will focus on the development and optimization of this innovative process (hybrid semiconductor/metal/semiconductor heterostructures), to study and understand the properties of N-polar III-N materials. The goal of the project is the achievement of high structural quality with low impurity concentrations N-polar planar III-N heterostructures grown on silicon substrates, which has never been achieved before. The N-polar III-Nitrides optimized in the project will be used to develop full RF HEMTs in order to evaluate their potential for high frequency applications (>40 GHz) for the first time.

The PhD candidate will carry out TCAD simulations and device fabrication of these novel devices.