Université Lille Nord de France
Pôle de Recherche et d'Enseignement Supérieur

Ecole doctorale régionale Sciences Pour l'Ingénieur
Lille Nord-de-France - 072

Titre Thèse	InP-HEMT for THz applications	
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Financement prévu	Contrat Doctoral Etablissement	ULille X. UPHF ☐ Centrale Lille ☐ Yncrea ☐
	Région – Autre ☐	Contrat de recherche ☐ Préciser :
Financement acquis ? ☐	Contrats de Recherche ☐ Préciser	Autre ☐ Préciser

Résumé du sujet :

Next generation of mobile network, 5G, and increasing bit rates require the development of millimeter and THz wireless communications. Recently, IEMN demonstrated the potentiality of its technologies for high bit rate wireless communication at 300GHz. Other demand concerns the development of passive millimeter wave camera for control access area (stadium, concert, check-in airport…). To keep potential weapons out public spaces, a rapid control system is needed. The main example is check-in passengers in airport. The associated effects of this additional security, including delays, long control times are tolerated by customers but causes huge inconvenience and cost. For high communication and security sensors, high frequency circuits are needed. IEMN develops advanced devices in its micro-nano-fabrication platform (1500m^2 cleanroom) and has all the equipment for the electrical characterization of advanced devices and circuits. ANODE group is currently developing transistor with maximum frequency of 500GHz and recently 1,1THz. Only 4 laboratories in the world demonstrated HEMT with f_{max} higher than 1THz. We proposed to explore the potentiality of these technologies for low noise and high sensitivity receptors. For confirming high frequency capabilities of our devices, microwave characterizations in the 110GHz-1THz frequency ranges are needed. Determination of accurate S parameters is an issue at these high frequencies. Design and fabrication of specific calibration kit is also needed. New HEMTs with f_{max} higher than 1THz will be also fabricated to confirm our preliminary results.
The PhD student will first start to work on the S parameter characterizations, using specific calibration kit developed by EM software and coupled procedure. New kit will be fabricated in the cleanroom facilities of IEMN. A second part of the work will be to confirm with new HEMT, f_{max} higher than 1THz. The PhD student will be in charge of the HEMT fabrication, microwave frequency measurements and noise characterizations.