iemn
Institut d'Electronique, de Microélectronique et de Nanotechnologie
UMR CNRS 8520

Master and Engineer Internship: 2018-2019

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Title : Broad band Light mater interaction enhancement in terahertz range

Abstract : ***TeraHertz*** (THz) science and technology are today showing exponential growth and give result in fundamental science from physics to biology and in application as in medicine or 5G telecommunication system. Still, the wavelength size in this frequency range is a strong limitation for miniaturization of functions and devices. Recently researcher of Terahertz photonics team of IEMN lab demonstrated a device (as shown in figure 1) showing broad band (0.2 – 2 THz) sub wavelength wave guiding. This butterfly allowed to perform THz spectroscopy of biological sample of less than 10 µL (http://www.mdpi.com/2304-6732/5/2/11)

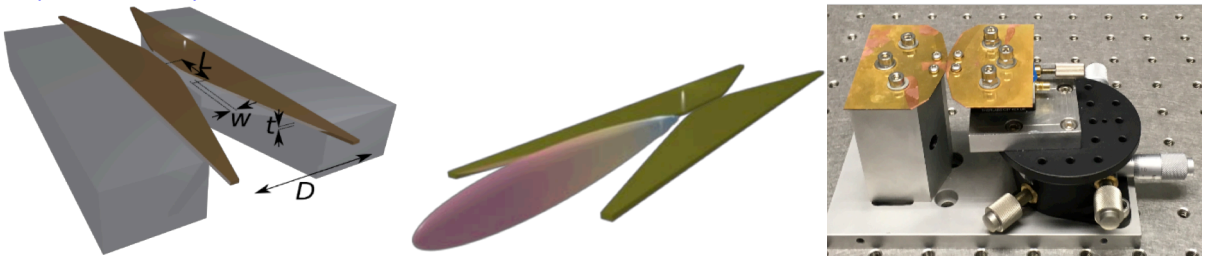

Figure 1 : Butterfly device for THz electromagnetic field concentration. Left 3D schematic, middle far field emission right realization.

The goal of this research internship is to use, expand and improve this device and technology to broaden its use beyond spectroscopic application. In this work, the student will design, fabricate and use these terahertz photonics devices in experiments. Consequently, the internship will begin with electromagnetic simulations (CST and/or Lumerical), a fabrication part and finally an experimental part (characterization first and then final use). The student will have to pick two pats on which he/she will spend most of his/her time.

The student will work with a team of experienced researchers in the THz-Photonics group at IEMN Laboratory (https://photoniquethz.iemn.univ-lille1.fr/en/). The group has a long lasting experience in the conception and realization of THz optoelectronic devices, and is fully equipped to carry out this project. The Laboratory hosts a 1500m2 clean-room with state of the art growth and fabrication facilities. IEMN is located in Lille, the capital of French Flanders, a vibrant city close to the Belgian border at 50min by train from Paris-CDG airport.

We are looking for physics or engineering master student or equivalent. Having of the following skills would greatly increase the chance of success of any application:

- Photonics/electromagnetic simulation
- Clean Room technology
- Optical experiments

The exact tasks in which the student will be involved will be discussed together with him/her and the team and will depends on its capacities and taste as the needs of the team

Key words : TeraHertz, electromagnetic simulation, antenna, wave guide