LABORATOIRE CHARLES COULOMB MONTPELLIER

Master 1 Internship/PhD Thesis

Blue and UV-emitting microdisk lasers for integrated photonics

Nanolasers are attracting a large interest because their wavelength-scaled optical cavities and the small number of quantum emitters involved in the laser operation lead to strong deviations compared to standard lasers.

The recent development of efficient active layers for blue and UV laser emission at room temperature has been achieved in nitride quantum wells grown on silicon substrates [1,2]. They are now efficiently coupled to photonic resonators – photonic crystal cavities and microdisks – so to form nanolasers analogous to the ones developed for the infrared spectral range and based on GaAs semiconductor nanostructures. They present a strong interest for future applications in bio-photonics, intra-chip communications and micro-LED lighting.

The present internship will be devoted to the optical investigation of the lasing characteristics (emission spectra, input-output curves) of such GaN-on-Si micro- and nano-lasers. Their emission dynamics will be measured and modeled into details in order to exhibit the potentialities to realize so-called “thresholdless lasers” with these devices.

This work is performed within a collaboration with the French laboratories CRHEA, C2N, INAC and with the Hong Kong University.

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1. Sellés, J. *et al.* Deep-UV nitride-on-silicon microdisk lasers. *Sci. Rep.* **6,** 21650 (2016).

2. Sellés, J. *et al.* III-Nitride-on-silicon microdisk lasers from the blue to the deep ultra-violet. *Appl. Phys. Lett.* **109,** 231101 (2016).