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Master in Photonics – “PHOTONICS BCN” Master ERASMUS Mundus “EuroPhotonics”

MASTER THESIS PROPOSAL

Dates: April 2021 - September 2022

Laboratory:

Institution: Monocrom SL

City, Country: Vilanova i la Geltrú, Catalonia

Title of the master thesis: Evaluation of tensile stress on the electrooptical characteristics of high power laser bar stacks

Name of the master thesis supervisor and co-supervisor: Carles Oriach Font

(for external proposals a co-supervisor from the Master program is needed)

Email address: c.oriach@monocrom.com

Phone number: +34 638046243

Mail address: c.oriach@monocrom.com

Keywords: stress, semiconductor lasers, electrooptical characteristics

Summary of the subject (maximum 1 page):

Mechanical stress changes the internal structure of semiconductor devices: it affects the bandgap, the lattice parameters and the refractive index. These changes, at their turn, modify electrooptical characteristics of the lasers that can be measured: polarization purity, far field distribution, threshold current, series resistance...

Monocrom has a patented mounting technology for laser bars using a direct mechanical contact instead of soldering materials. Therefore, the mounting stress is applied on the opposite directions with respect to the standard techniques, furthermore with an increased magnitude and in a controllable way. The effects of the clamping force on the laser characteristics have been studied recently at a single bar level.

The aim of this master thesis project is to characterize the effects of the clamping force in stacks of several laser bars, study the differences of their electrooptical performance and correlate them to the stress distribution along the stack.

In order to fulfil the goal the current laboratory setup will have to be adapted, mounted and calibrated. The student will have to operate the diode laser modules, thoroughly test them,



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report the results and propose hypothesis about the physical phenomena leading to the observations.

Additional information (if needed):

* Required skills : autonomy, proactiveness, experimental mind-set

* Miscellaneous : Acquisition of some setup parts as well as manufacturing the stacks require several weeks. Therefore it will be essential for the company to know in advance whether a student will be selecting our proposal, so all the purchasing process can be completed at the time the student can start working on it.

Monocrom will provide documents and FEM simulations to the student prior to the project start so the student can acquire familiarity with the current setups, results and goals.