croma | Centre de Radiofréquences, Optique et Micro-nanoélectronique des Alpes

Sujet de stage

Characterization of dielectric/silicon interfaces using second harmonic generation

Mots clés : caractérisation des interfaces diélectriques - semiconducteurs, optique non-linéaire.

Localisation: **laboratoire CROMA (UMR 5130).**

Encadrants : Lionel BASTARD (CROMA) et Irina IONICA (CROMA).

Période et durée : Printemps 2025, 6 mois.

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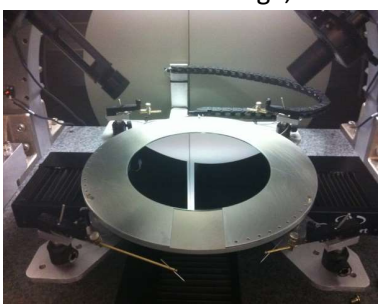
Plus d'informations : http://croma.grenoble-inp.fr/

Contexte & description :

A novel method to achieve non-destructive electrical characterization of interfaces using second harmonic generation (SHG) is currently under active development at the laboratory, within a collaboration with STMicroelectronics. This technique has passed the demonstration stage, but in order to be used as an in-line metrology tool in the industry, it needs to prove its ability to distinguish and quantify two different electrical properties of the interfaces: the trap density and the fixed charges. In order to provide this functionality, a calibration procedure of the raw results from SHG measurement must be developed and it is the aim of the internship. The calibration procedure will be obtained by characterizing simple stacks using both SHG and other established characterization methods such as capacitance – voltage (C-V) measurements.



During the internship, the work will include:

- Understanding theoretical aspects: second harmonic generation, electric field distribution in semiconductor structures, charges and defaults at the interface between dielectric and semiconductor materials.
- Using SHG characterization tool available at CROMA to test simple stack structures under different configurations (influence of the laser power, influence of the substrate bias, …)
- Develop a model to fit the experimental curves.
- Compare the SHG measurement with C-V measurements in order to provide a method to separate traps and fixed charges densities from SHG measurements.

Profil recherché : The intern will work in close collaboration with permanent researchers and a post-doctorate fellow involved in this project from the laboratory. She/he will participate to the meetings with STMicroelectronics to discuss project advancements. We are looking for motivated candidates, with strong knowledge in non-linear optics and/or semiconductor physics and who are willing to actively participate to a collaborative project. During this multidisciplinary internship, the student will develop both experimental and theoretical skills that can be put to profit for his/her future career in both academic and industrial worlds.

Candidature : Pour postuler à cette offre, merci d'envoyer par mail (voir contact ci-dessus) votre candidature qui devra présenter une lettre de motivation, votre CV, une copie des notes et diplômes.

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