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## Sujet de thèse

Laboratoire: Institut Fresnel

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**Titre : *In vivo* imaging of oyster with nonlinear microscopy**

### Description :

Biomineralization integrates complex biological, chemical and physical processes to control the formation of mineralized tissues in living organisms. Deciphering these mechanisms is of crucial importance for fundamental knowledges and strategies for the synthesis of bioinspired materials. Although classical crystallisation theory cannot be invoked for explaining the formation of biomineral, to date, a detailed understanding of biomineralization is still lacking.

We propose to study, *in vivo*, the biomineralization process which consist for the oyster, *Pinctada Margaritifera*, to build its shell. Coherent Raman (CR) microscopy will be implemented to image the amorphous carbonate and the crystalline carbonate during the mineralization of the shell. The CR contrast is a resonant process with a molecular level, which allows specific chemical imaging without the use of fluorescent markers or dyes. In recent years, Coherent Raman microscopy have evolved to become a powerful imaging and spectroscopy tool for investigating the biological world.

The thesis will take place at the Institut Fresnel in Saint Jérôme campus. The PhD student will integrate a group of researchers with strong expertise in biomineralization and advanced optical microscopy approaches. During the thesis, alive animals will be received from Tahiti (IFREMER) and will be grown in aquarium at the institute. Thus, the students will have to develop the experimental setup and protocol to allow for the *in vivo* imaging of living mollusc shells and conduct first *in vivo* experiments to investigate the biomineralization process. Strong skills in optics and experiments are expected.