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ORGANIC/INORGANIC INTERFACES IN CALCIUM CARBONATE BIOMINERALS: THE CASE OF *PINNA NOBILIS* SHELL (BIVALVIA, PTERIOMORPHIA)

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Biominerals are organo-minerals structures produced by living systems. Since the Cambrian, they contribute to the adaptation of living organisms to different environments by fulfilling a variety of functions that go along with adapted morphologies. One of the aims of biomineralization is to understand how organisms "sculpt" these complex morphologies at nano and molecular scales: we know that occluded organic matrix (OM) proteins influence the lattice parameters of biominerals [1] and that many of them strongly interact with the mineral phase in *in vitro* assays, but their exact roles are still to be known. The aim of my PhD is to understand the complex relationships between the organic and mineral phases. In the present study, I discuss the case of the Mediterranean fan mussel *Pinna nobilis*.

Like most molluscs, *Pinna nobilis*, the fan mussel, envelops its soft body with a highly ordered shell composed of two mineralized layers: the internal one is nacreous made of aragonite, while the outer one is made of long calcitic prisms that grow perpendicularly to the surface of the shell. This latter shell layer comprises an assemblage of insoluble periprismatic matrix (proteins + saccharides) and very acidic "intracrystalline" proteins and sugars, together with pigments. This shell layer was submitted to:

- Morphological and spectral characterization: To unveil the complex and hierarchical structures of biomineral models, we have acquired high-resolution 2D and 3D images by using different microscopic and spectro-microscopic techniques at Synchrotron SOLEIL. Under UV light, we have recently evidenced a striking luminescent pattern - never observed before - in relation to pigments.
- Biochemical analysis of organic matrix: we have analyzed the intra and inter-prismatic OM by gel electrophoresis, ELISA test and western blot. Moreover, a transcriptome constructed from the mantle tissues has helped us to identify by proteomics a large set of proteins associated to the formation of prisms.

The significance of our results is discussed here. Our data tend to show that the formation of "simple prisms" is an extremely regulated process, which requires several molecular actors.

[1] Zolotoyabko, E. (2017), *Adv. Mater. Interfaces* 4, 1600189.