The architecture of monospecific microalgae biofilms (Oral)

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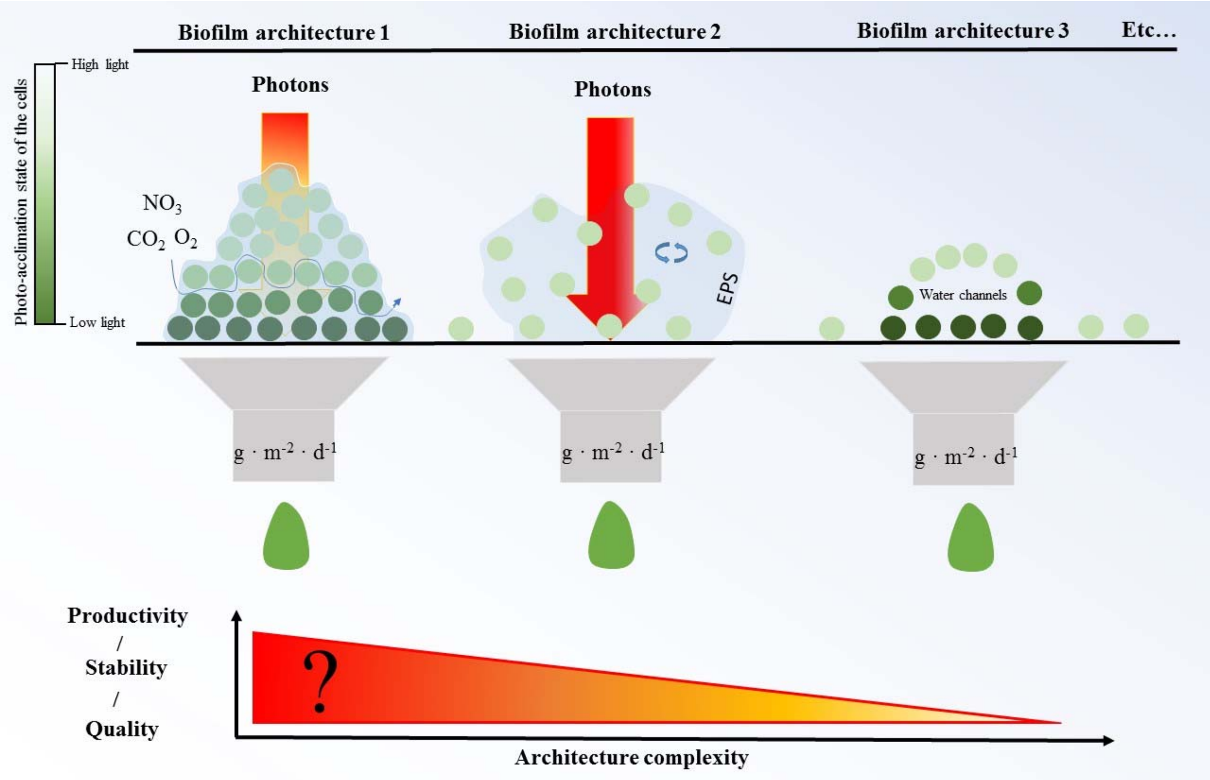
Abstract:
Microalgae biofilms have been proposed as an efficient alternative to suspended cultures [1]. They offer enhanced productivities and straightforward harvesting by simple scrapping. However, little is known about their structure (spatial arrangement of cells, colonies and Extracellular PolymerS; EPS), which may strongly impact bioprocess stability and productivity (see Figure). For example, nutrient diffusion may decrease as a function of the cell density or colonies size and light is attenuated and may become limiting for the deeper cell layers in very thick biofilms [2]. In order to better understand the structure development in microalgae biofilms, several microalgae strains were cultivated under static and dynamic conditions (the latter to simulate conditions closer to reality) and their architecture characterized *in situ* using confocal laser scanning microscopy.
Under static conditions, the general trend of the structural parameters resembled that described for fungi and bacteria: thickness and biomass increased over time whereas the roughness of the biofilm decreased reflecting cell proliferation and voids filling, respectively. However great variability of these parameters was observed among the species suggesting species-specific architectures. The same was true for the EPS that remained constant in some species and increased over time in others. When cultivated under different hydrodynamics, the biofilms grown under higher flow rate demonstrated greater resistance to detachment.

Our results revealed that the architecture of microalgae biofilms is species-specific and that growth conditions may alter their mechanical properties. This implies that the selection of the species and growth conditions are key steps to improve bioprocess stability and productivity.



Keywords:
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