The design of green formulations: the employment of biosurfactants

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Environmental sustainability is one of the key targets of current political, technological and scientific action, driving the development of new strategies to remove pollutants, reduce the waste and replace the toxic chemicals with eco-friendly alternatives. The increased demand for raw materials, and the simultaneous shortage of them, prompts fine industry to choose bioinspired and/or bioderived components for the eco-design of chemical formulations [1].
In this framework, biosurfactants are taking high visibility as potential substitutes of synthetic ones [2]. These molecules are produced by bacteria, yeasts, fungi and plants and present not only a favorable ecological profile but also appealing technological performances. Rhamnolipids are among the most studied biosurfactants, biotechnologically produced and commercially available. They are glycolipids composed by one or two rhamnose units, linked to one or two fatty acid chains. Rhamnolipids show high surface activity; for these reasons, they are promising raw material for innovative detergent formulations. In this perspective, the comprehension of their behaviour when mixed with other components generally included in in this kind of products is fundamental. In the present contribution we investigate rhamnolipids in mixtures with conventional surfactants. We consider both anionic (such as sodium lauryl ether sulfate, SLES) and cationic (i.e., cetyltrimethylammonium chloride, CTAC) surfactants massively used in detergent formulations. The mutual interactions determine the structural, dynamic and functional properties of these mixtures. Particularly, the strong synergism between the components determines the formation of bulky aggregates at low surfactant concentration. Our results contribute to build a scientific platform for the rational design of green formulations.

References

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