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Nanocapsules bacterial production with an adjustable responsive polymer corona.

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PURPOSE OF THE ABSTRACT

Cell's machineries offer biosynthetic schemes capable to replace in glassware complex formulations for the production of colloidal objects, such as metal particles or globules of bioplastics that are now scalable up to industrial scale. Rerouting membrane biosynthesis is a yet unexplored opportunity for greener and mild preparations of micro/nanocapsules. To this aim, we overexpressed in E. Coli, membrane-proliferation-inducer proteins. The intrabacterial membranes form various morphologies, including vesicles, onion-like stacked bilayers. Design of sequences enabled to prepare functionalized proteo-lipidic assemblies.(1)

We overexpressed an amphiphilic polypeptide scaffold of tailored sequence, that can contain tags to target functionalization with fluorophores and/or polymers. We obtained well-defined populations of proteolipidic capsules. Their size and composition were characterized by particle tracking, DLS, fluorescence. We assessed the high intramembrane peptide density (reaching values well above that obtained by in vitro encapsulation in liposomes), and full orientation of the functional peptide moieties (100% display in outer corona), enabling straightforward chemical post-modifications. Loading proteins in the internal compartment of the vesicles was also possible. Stimuli-responsive capsules, sp. temperature switchable properties were imparted to the capsules by either genetically encoded sequences of peptide or post-grafting of a responsive macromolecule,

Altogether, our results show the feasibility of in cellulo proliferation of nanocapsules (semi-artificial proteoliposomes) that are compatible with a diversity of design, either via post-functionalization or by engineering of the polypeptide corona to make the capsules stimuli-responsive.

FIGURES

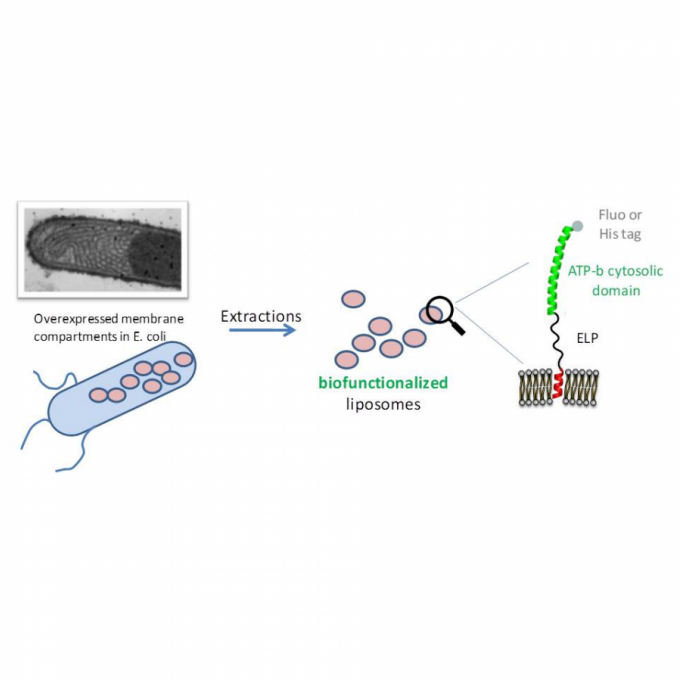

FIGURE 1

figure 1

FIGURE 2

KEYWORDS

encapsulation | polypeptide | stimuli-responsive | nanocapsules

BIBLIOGRAPHY

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