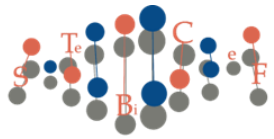
First STeBICeF
Young Researcher Workshop
Palermo, 12 Gennaio 2023



Bacterial biofilms for environmental bioremediation

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Bioremediation is a promising technology for the treatment of polluted environments based on the biodegradation capacities of native or introduced microbial populations. Bioremediation is traditionally carried out using free bacterial cells, though utilization of immobilized bacterial cells on adsorbing matrices is a promising technique due to biotechnological and economic benefits. Bacterial biofilms show greater resilience, survival and degradative activity for longer periods than cells in the planktonic state. A bioremediation system was developed immobilizing highly performant hydrocarbon (HC)-degrading bacteria on biodegradable oil-absorbing biopolimeric carriers. Soil HC degrading Actinobacteria *Nocardia cyriacigeorgica* SoB, *Gordonia amicalis* SoCg [1], and marine hydrocarbonoclastic Gammaproteobacteria *Alcanivorax borkumensis* AU3-AA-7 [2] were immobilized on polylactic acid (PLA) and polycaprolactone (PCL) membranes prepared by electrospinning [3]. The capacity of adhesion and proliferation of bacterial cells into the biopolymers were evaluated using scanning electron microscopy (SEM) after 5, 10 and 15 days, and their survival was monitored over time simulating storage effects. PLA and PCL nanofibers were covered by bacterial cells already after 5 days incubation. Total biomass (estimated as total dsDNA) extracted from biofilms confirmed the colonization up to 15 days incubation. Viable plate counts showed that survival of the bacterial strains was high for the entire experimental period, and bacterial biofilms adsorbed on biopolymers were still viable after 30 days. HC biodegradation ability of biofilms, assessed by GC-FID analysis, resulted higher in respect to the corresponding free-living bacterial cultures. Expression of the biodegradative genes in biofilms are in progress.

References

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- Elisa Maria Petta's PhD grant is financed by PON "Research and Innovation" 2014-2020, Axis IV "Education and research for recovery" Action IV.5 "PhDs on green issues".

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