



PCL/PEG based membranes for bacterial cells immobilization stimulate actinorhodin antibiotic production in *S. coelicolor*

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The actinomycetes, Gram-positive filamentous bacteria, are the most prolific source of natural antibiotics. At industrial level, antibiotics from actinomycetes are usually produced at low levels by mean of fermentative processes in submerged cultivations, where one of the major factors negatively affecting bioproductivity is the phenomenon of a pellet-shaped biomass growth. The strategies based on cell-immobilization, which were already proven improving bacterial bioprocess productivity, could stimulate antibiotic production in actinomycetes.

Accordingly, polycaprolactone (PCL)/polyethylene glycol (PEG)-based porous membranes, having pore sizes of 50, 100 and 500 μm , were used for the immobilization of *Streptomyces coelicolor*, a model strain for studying actinomycete biology. Using 96-well microtiter for bacterial cultivations, the immobilized *S. coelicolor* cells formed a dense layer on pore lumen of all PCL/PEG membranes tested as revealed by scanning electron microscope. In particular, the actinorhodin and biomass production yields were strongly pore-size dependent with the 100 μm sized pores showing the best performance in the respect of free cell cultivations. Similar results were obtained using tester tubes instead of 96-well microtiters too.

Therefore, microporous PCL/PEG membranes could be useful tool for antibiotic production improvement in actinomycete-based bioproduction processes. In addition, they can be exploited to study the biochemical and metabolic events which lead to the improvement of bioproductivity in immobilized bacterial cells.