

Summary of stage 2

Phase 2 of the project 74 PCCDI/2018 (acronym TehnoBioMed): “Emerging molecular technologies based on micro and nano-structured systems with biomedical applications” had unfolded in 5 constituent projects, comprising a total number of 24 activities. Hereby we briefly present the principal results obtained for each of the constituent project.

Project component 1

- A series of antimicrobial peptide-based functionalization procedures of the plasmonic nanoplatforms were developed.
- The assessment of morphological and functional characteristics of the functionalized plasmonic nanoplatforms was performed.
- The interaction between the planktonic and/or sessile bacterial populations (biofilms) and the functionalized plasmonic nanoplatforms was tested by using biocompatibility tests.
- Two methods (the disk-diffusion method and the microtiter plate method, respectively) were successfully tested and optimized in order to generate a bacterial biofilm model, suitable to characterize the multifunctional plasmonic nanoplatforms.

Project component 2

- The interaction between (I) dendrimers of several generations and nanopores and (II) the transport process of dendrimers through nanopores were successfully characterized.
- The controlled transport of a series of biologically active molecules (peptides, DNA, pharmaceutical compounds), confined inside dendrimeric and nanometric-size cavities, through the nanopores, were successfully characterized.
- The optimum, environmental conditions (chemical composition, pH, ionic strength) necessary for the release of biologically active molecules confined inside the dendrimeric and nanometric-size cavities were identified.

Project component 3

- The development, alignment and testing of the OCT imaging system was assessed.
- The investigation and diagnosis method, together with the next stage development of the proposed method to be employed during the OCT examination tests were established.
- Preliminary tests using material probes and the investigation of biological probes were performed.

Project component 4

- Anti-pesticide antibodies synthesis was attained and the standard procedures to obtain and immunologically characterize the antibodies were established.
- Two types of nano-immuno-adsorbents: antigen/antibody and the corresponding enzymatic markers were made. The standard procedures to produce and characterize the nano-immuno-adsorbents and the corresponding enzymatic markers were established.
- There were established the standard analytical procedures by using the following methods: TEM, FTIR, AFM.

Project component 5

- The optimization of the purification method of phycobiliproteins from cyanobacteria cultures.
- We attained the anti-phycoerythrin and anti- phycoerythrin antibodies to be used in the affinity chromatography, in order to purify phycoerythrin and phycoerythrin from algae and cyanobacteria, respectively.
- The characterization of the excited stages dynamics and the mapping of the energetic transfer pathways for phycobiliproteins and phycobilisomes.