

Hybrid nanomaterials with enhanced singlet oxygen generation for photodynamic therapy

Name of the Group: Supramolecular Systems in Nanobiomedicine (Faculty of Pharmacy)

Short description of the project: Photodynamic therapy (PDT) is a therapeutical strategy for cancer, where photosensitizer drugs (PS) are administered, and then activated with focalized light to produce singlet oxygen (SO) in the tumour, inducing the death of cancer cells. However, PS are distributed across the body, leading to important side effects after sun exposure. Incorporation of PS onto nanostructured materials will improve their safety and efficacy. Preliminary work indicates that encapsulation or conjugation of PS in the materials enhances their capability of generating SO and the overall efficiency of the PDT process. This project will involve the preparation of different PS and their immobilization onto water soluble nano and microparticles functionalized with specific antibodies as deliverers to cancer cells. Assessment of their potential in PDT will be done by analysis of singlet oxygen production. There is the possibility of continuity towards a doctoral thesis.

Contact persons:

Dra. Ma Lluïsa Pérez-García, mlperez@ub.edu

Dr David Limón, davidlimon@ub.edu

Light-controlled molecular machines

Name of the Group: Supramolecular Systems in Nanobiomedicine (Faculty of Pharmacy)

Short description of the project: Artificial molecular motors, where molecules can travel across microscopic materials in the presence of an external stimulus, have great implications in many aspects of science. However, a controlled transport of molecules across supramolecular systems has yet to be achieved. Based on preliminary experiments, we intend to design a purely supramolecular system where a molecular “traveller” moves along a “path” over several microns when irradiated with visible light. Real time imaging of the motion using total internal reflection fluorescence microscopy will be used to observe molecules move along fibres upon irradiation. There is the possibility of continuity towards a doctoral thesis.

Contact persons:

Dra. Ma Lluïsa Pérez-García, mlperez@ub.edu

Dr David Limón, davidlimon@ub.edu

Biofunctionalisation of silicon microchips for real-time intracellular sensing

Name of the Group: Supramolecular Systems in Nanobiomedicine (Faculty of Pharmacy)

Short description of the project: The present project will involve the bio-functionalisation of silicon microparticles with synthetic organic moieties designed to interact with biological material and sense its function. The overall objective is to prepare cellular sensors to monitor different cellular parameters, such as the presence of different peptides and proteins involved in apoptosis with implications in cancer. In order to succeed in this complex project a highly interdisciplinary approach is necessary, and the research is integrated within a coordinated project that aims to find functional microchips to study, tag and act on living cells. There is the possibility of continuity towards a doctoral thesis.

Contact persons:

Dra. Ma Lluïsa Pérez-García, mlperez@ub.edu

Dr David Limón, davidlimon@ub.edu