

Tetrapyrrole nanostructures towards fluorescent molecular markers for biomedicine (Bio-Mark)

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Abstract

In recent few years the use of near infrared (NIR) fluorescent probes in biomedical applications increased exponentially. Porphyrins are structures that mimic naturally occurring compounds and promising candidates as fluorescent markers^{1,2}. This new field of use for porphyrins was partially steamed by their application as sensitizers in photodynamic therapy (PDT), exhibiting convenient absorption in the phototherapeutic window (~670 to 1100nm). Focus on all classes of NIR probes was mostly triggered by the development of reliable and inexpensive NIR emitting laser diodes. NIR probes are also suitable for biological applications, since light of longer wavelengths penetrates the tissue more easily and without interferences, making them more attractive for *in vivo* measurements. Photophysics of NIR dyes at interfaces and in restricted environments is a frontier area in fields spanning from *in vivo* imaging in biomedicine to optoelectronics, reason why the studies of this proposal will certainly contribute to build-up a technological platform that will advance knowledge across these fields. The adequacy of using new porphyrins as fluorescent probes for imaging techniques, particularly fluorescence microscopy, will open new research pathways in molecular and cellular biology supported by the teams expertise in fine synthesis and photophysical characterization and *in vitro* models³⁻⁵. The EU Bio-Mark project aims to develop novel non-invasive or minimally invasive diagnostic tools for assessing cell/tissue metabolism and/or functions in order to discriminate pathological disturbances in early disease stages. The members of the ESTG team are photochemistry and photocatalysis experts and are in charge of the basic characterisation of the photophysics of the new probes in solution, of the study of their aggregation and light fastening properties. UV-VIS, fluorescence, FTIR, HPLC and GC techniques are available for these studies. Solid samples preparation for advanced photophysical analysis at Coordinator's laboratory will be also prepared by our group.

¹Patrice T. (Eds.), Photodynamic Therapy (Comprehensive Series in Photochemical & Photobiological Sciences), The Royal Society of Chemistry, 2003

² Dev Kumar Chatterjee, *Advanced Drug Delivery Reviews* **60** (2008) 1627–1637

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