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seminar

Wednesday, 27th January, 9.30am, Online

Host: Dr. Sergio Moya

Biological Fate of Soft Nanomaterials: A Physico-Chemical and Translocation Study

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Soft Matter Nanotechnology
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In recent decades, the use of nanomaterials in the biomedical field has increased considerably. Despite many efforts, the medical translation of nanomaterials is limited. The efficacy of nanomaterials in therapy is strongly correlated to their capacity to reach specific organs, or cells and tissues and deliver their cargo. However, nanomaterials may undergo transformations during translocation or circulation leading to their aggregation, degradation, or lose of integrity, which may compromise their therapeutic efficacy. Issues such as degradation or aggregation of nanomaterials in biological matrices are seldom considered in the design and synthesis of nanocarriers. Nanomaterials also interact with biomolecules such as proteins, which form a coating around them, the so-called bio or protein corona, which gives a biological identity to the nanomaterials impacting on their translocation and biodistribution. Understanding nanomaterial behaviour in biologically relevant conditions such as physiological pH, temperature, the presence of biomolecules, or how their cargo affects their properties is also of fundamental relevance for the design of successful nanocarriers.

In this thesis we aim to advance the understanding of the physico-chemical properties and transformations of nanomaterials in a intracellular environment and in biological relevant media. We have worked with different nanomaterials: hydrogels, metal nanoparticles engineered with polymer brushes, gold nanoparticles and supramolecular polymer nanoparticles. Each nanomaterial considered allows us to address a different aspect of the interaction of nanomaterials with the cellular environment.