Design of photoactive colloids for singlet oxygen production

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Photoreactions initiated by organic catalysts are an important topic in photochemistry for selective oxygenation with singlet oxygen ($^1O_2$, Fig. 1): the main applications include the production of fine chemicals and pharmaceuticals, water disinfection, microbial inactivation and Photodynamic Therapy (PDT). Photosensitizer (PS) is an organic dye capable of yielding singlet oxygen upon absorption of a photon via energy transfer (ET) between the excited dye molecule and ground-state oxygen (Fig. 1)

Systems using catalytic amounts of a photosensitizer, supported on an inert (organic or inorganic) substrate, allow to tune the absorption range by proper choice of the PS, and to optimize its efficiency by a better control of its aggregation and stability in a given medium.[1,2]

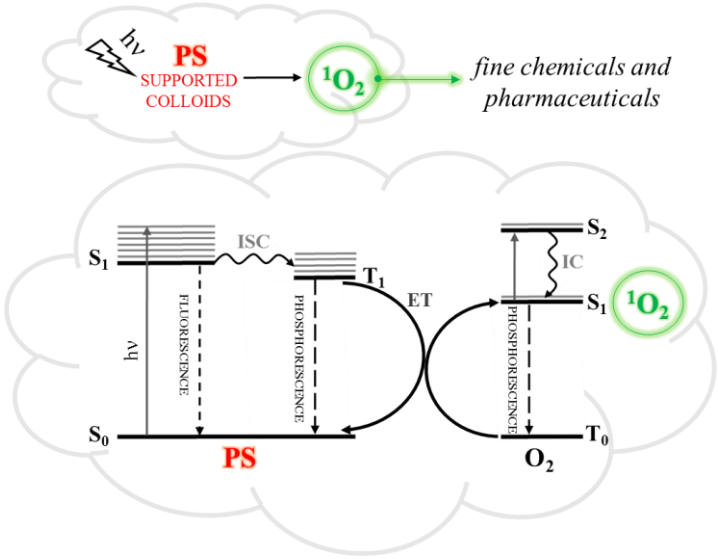

Figure 1. Jablonski diagram representing schematically the photosensitized production of singlet oxygen by PS-grafted submicronic colloids.

In this presentation we will describe the design and the characterization of original PS-grafted submicron colloids, either core-shell silica particles or soft polymer colloids. In particular, the efficiency of such materials as sensitizing platforms will be compared through the determination of their quantum yields of singlet oxygen production.[3,4] These properties, associated with relevant colloidal features, are required to further select the most efficient PS-supported colloids for the preparation of fine-chemicals in a continuous flow photoreactor (PICPOSS ANR project).

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