

Mesoporous Core-shell Silica Nanoparticles grafted with new Halogenated Bodipy for PDT applications

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Nanostructured hybrid materials, are gaining interest for photodynamic therapy (PDT) application as a non-invasive treatment to fight diseases such as cancer. PDT consists in the accumulation of a photosensitizer (PS) containing nanomaterial in tumour tissues for their irradiation by VIS or NIR light in order to locally produce singlet oxygen able to kill tumour cells.

In this work mesoporous silica core-shell nanoparticles are selected as ideal drug carriers due to their low-toxicity, tuneable size and a surface easily to be functionalized. The silica nanoparticles were synthesized by so-gel process in order to control the particles size (around 50 nm), shape (spherical) and porosity and PS was grafted at the external surface grafted with original PSs.

The most important properties of suitable photosensitizer's are: strong VIS/NIR absorption bands and intersystem crossing (ISC) efficiency to generate singlet oxygen. New halogenated Boron DiPyrromethene (BODIPY) were studied as PSs because of their high singlet oxygen efficiency, which were measured by different (direct and indirect) methods. Besides comparing singlet oxygen quantum yields of various halogenated BODIPYS, two of them with suitable grafting groups were grafted onto mesoporous silica nanoparticle for singlet oxygen generation. The singlet oxygen quantum yield (Φ_{Δ}) of these functionalized BODIPYS will be compared before and after grafting in order to obtain suitable materials for PDT applications.

References

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Figures a) and b) TEM image of core-shell silica nanoparticles before grafting; c) Singlet oxygen emission at 1270 nm in ACN of a new synthesized BODIPY.

