Silica nanoparticles for bioimaging and Photodynamic Therapy

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Abstract

Mesoporous silica nanoparticles are potential drug delivery systems for biomedical applications. Spherical nanoparticles are synthesized by Stöber method with core-shell structure and monodisperse size distribution of around 50 nm, Figure1.[1] In this work, fluorescent dyes are embedded in the core and photosensitizers (PS), able to generate singlet oxygen (cytotoxic species), are grafted on the shell to trigger dual activity bioimaging and photodynamic therapy respectively.[2]
The hybrid system has been optimized with commercial photosensitizer; Rose Bengal (RB) or Thionine (Th) before using new photosensitizers based on BODIPY structure.
To improve stability in water for biological applications a short chain of polyethylene glycol (PEG) is anchored to the external surface, Figure 2. Moreover, PEG prolongs the hybrids system life-time in blood.[3] As a result, well-dispersed silica nanoparticles with good singlet oxygen production and well-dispersed are obtained. "In vitro" experiments will be carried out to check their phototherapy activity in Hela cells.

References

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[3] Alexis, F.; Pridgen, E.; Molrnar, L.K. Farokhazad, O.C., Molecular Pharmaceutics, 4 (2008) 505

Figures

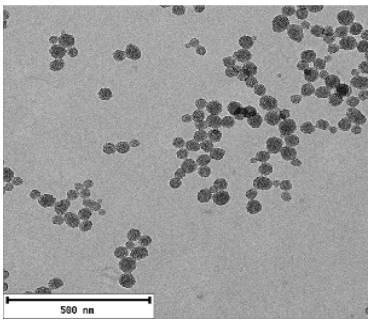

Figure 1: TEM image of mesoporous silica nanoparticles with around 50 nm size

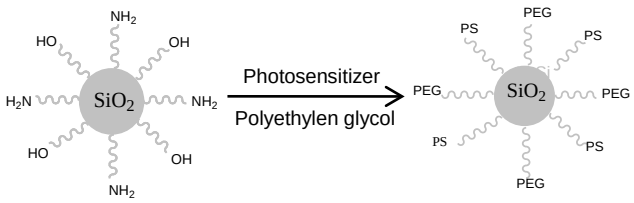

Figure 2: Schematic representation of nanoparticle grafting