LUMINESCENT POLYMER-SIO_2 NANOCOMPOSITES FOR CELL LABELING

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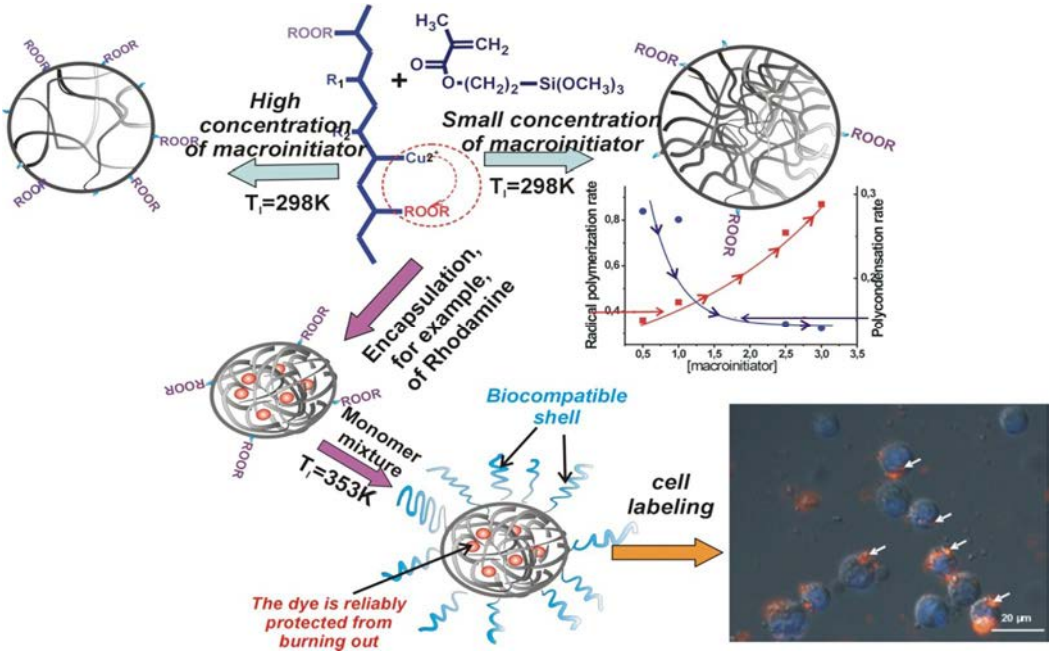
Hybrid polymer coated silica nanoparticles (NPs) were synthesized using low temperature graft (co)polymerization of trimethoxysilane propyl methacrylate (MPTS) initiated by surface-active oligoperoxide metal complex (OMC) in aqueous media. These NPs were characterized by means of kinetic, solid-state NMR, TEM and FTIR techniques. Two processes, namely the radical graft-copolymerization due to presence of double bonds and 3D polycondensation provided by the intra- or/and intermolecular interaction of organosilicic fragments, occurred simultaneously. This mechanism was confirmed by a combination of the kinetic and structural (including solid-state NMR) approaches. The relative contribution of the reactions depending on initiator concentration and pH (it was also a convenient tool for controlling the size, density of core compaction and surface functionality of the synthesized NPs) value leading to the formation of low cured polydisperse microparticles or OMC coated SiO2 NPs of controlled curing degree was studied. The availability of free-radical forming peroxide fragments on the surface of SiO2 NPs provides an opportunity for seeded polymerization leading to the formation of the functional polymer coated NPs with controlled particle structure, size, and functionality. Encapsulation of the luminescent dye (Rhodamine 6G) in SiO2 core of functionalized NPs provided a noticeable increase in their resistance to photo-bleaching and improved biocompatibility. These luminescent NPs were not only attached to murine leukemia L1210 cells but also tolerated by the mammalian cells. Their potential use for labeling of the mammalian cells is considered.



Scheme for the formation of nanocomposite particles with SiO2 core and functional polymeric shell.