Synthesis and characterization of fluorescent fullerene-silica nanoparticles for bioimaging applications

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Fluorescent nanomaterials are of great interest in biotechnology for diverse applications such as cell imaging, targeting, and detecting agents. In this work, we prepared a fluorescent nanoparticles based on fullerene-silica hybridization by a reverse-microemulsion method. The fullerene-silica nanoparticles (FSNP) of 60 nm in diameter exhibited broad fluorescence with maximum peak at 600 nm by excitation 350 nm. Compared to conventional dye (Alexa488 fluorophor), the FSNP showed 10 times higher photostability revealing by single dot fluoresecne analysis. XPS and FT-IR analysis revealed that fullerene were hybridized with silica network in form of C-O-Si which is originated in new fluorescence of FSNP. The fluorescence microscopic images of FSNP uptake various cell line demonstrated that the FSNP were effective for cell penetration and had potential in drug delivery. Besides, the cell viability result supported the utilization of FSNP as a safe bioimaging agent. We believed that the new synthetic FSNP can be a promising fluorescent probe for bioimaging analysis.