

Synthesis of fluorescent silica nanoparticles using immiscible solvents for bioimaging

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Nanoparticles are very promising for biomedical applications owing to their unique physical and chemical properties. However, their application in clinical trials may be hindered by their toxicity. Among various biomedical materials, silica nanoparticles (SNPs) are most attractive and widely studied materials as they have high biocompatibility and functionality. In this study, we have synthesized fluorescent SNPs with controlled shapes and sizes by using SiCl_4 . To control the reaction rate of SiCl_4 with water, two solvents immiscible with each other were employed. Our SNPs exhibit fluorescence near 2.95 eV (420 nm), originated from optically active silanone and dioxasilyrane defects, and are applied to in-vitro bioimaging of lung epithelial carcinoma cells (A549) without cytotoxicity. We believe that our novel synthesis method using orthogonal solvents will broaden the application range of highly reactive but potentially suitable precursors, which successfully realizes SNPs with defect-induced optical properties for various biomedical applications.