Synthesis of fluorescent silicon nanoparticles from organosilanes and organic acid

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Abstract: Until now, the unique properties of silicon nanoparticles (SiNPs) including water solubility, strong photostability, pH stability, and non-toxicity have been uncovered, which renders SiNPs to be applicable to many research fields. In this study, we report simple hydrothermal method for the synthesis of blue fluorescent SiNPs from 3-aminopropyl triethoxysilane (APTES) and maleic acid (MA). From the characterization of carboxylic acid groups in SiNPs, surface stabilization has been explained the high dispersion stability of prepared SiNPs. The carboxylic acid-functionalized SiNPs (COOH-SiNPs) presented fluorescence quantum yield more than 32%, high water-dispersibility, non-toxicity, and stability in physiological media, which is very promising for the wide application of SiNPs in many areas including biosensors, bioimaging agents, and drug carriers.

Keywords: Silicon nanoparticles; Maleic acid; Hydrothermal; Fluorescence