Tuning the properties of silicon nanocrystals for bioimaging applications.

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Nanoparticles have recently attracted attention in the biomedical field as a medical diagnostic and curative tool. Silicon nanocrystals are a highly efficient, non-toxic and elementally abundant alternative to metallic nanoparticles as a biological platform. Their superior optical properties and surface versatility offer perspective applications as biological markers for fluorescence optical imaging, positron emission tomography or magnetic resonance imaging.[1]

The silicon nanocrystals are synthesized via heating of a silicon-based oligomer followed by etching with hydrofluoric acid to obtain free standing silicon nanocrystals with a hydride-terminated surface.[2] By defining the heating and etching process, a great control of the size and shape of the nanocrystals can be achieved and subsequently a control of their inherent optical properties.

After synthesis, the hydride terminated surface can be passivated with a large variety of surface groups. Various properties, such as the water dispersibility necessary for applications in aqueous environments and biological systems, can be achieved by grafting suitable molecules onto the surface of our silicon nanocrystals.[3]

The research presented focuses on the synthesis, surface modification with biologically relevant molecules and characterization of silicon nanocrystals that may have application as imaging agents in biomedicine.

Keywords: silicon nanoparticles, photoluminescence, surface modification, bioimaging, medical applications

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