The electronic and optical properties that make the semiconductor silicon so useful for solid-state devices such as solar cells and microelectronics can also be harnessed for biological applications—in particular in vivo imaging and drug delivery. This presentation will discuss the chemistry and photochemistry of nanostructured porous silicon. The intrinsic photoluminescence that derives from quantum confinement and surface defect states provides a non-toxic and biodegradable luminescent probe for in vivo and in vitro imaging. The luminescence properties are intimately tied to the surface chemistry of the material, and the relatively long (microseconds) excited state lifetime of this material can be harnessed for time-gated imaging or chemical sensing. Applications in sensing, drug delivery, and targeted therapies will be discussed.

Keywords: Si nanoparticles, quantum dots, biomaterials

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