ORG-PO-218

New bioorganic materials

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This study delves into Porous Silicon Nanoparticles (PSiNPs), with a specific focus on their potential surface passivation with bioorganic molecules for therapeutic applications1. Porous Silicon (PSi) is a nanostructured material renowned for its optical properties and sponge-like morphology, characterized by a substantial surface area that renders it highly suitable for biomolecule decoration. The optical properties of PSi stem from voids within its network, which can be controlled by adjusting various process parameters (crystalline silicon doping, attack time, electrolyte concentration, etc.), yielding diverse photonic structures (Fabry-Perot Bragg mirror, optical microcavity, aperiodic multilayer sequence, etc).2 3 4

The primary challenge associated with employing PSi lies in its chemical instability when exposed to air or aqueous environments. In such conditions, the native Si-H bonds undergo replacement with Si-O-Si bonds, resulting in the formation of a surface oxide layer. This chemical transformation is thermodynamically driven and compromises the stability of PSi. To overcome this hurdle and ensure the stability of PSiNPs, a crucial passivation process for their surface is imperative.4 In this study, PSiNPs have been effectively passivated using carbohydrates to enhance their suitability for drug delivery applications.