

OA 3 - Biofabrication with Chitosan – Connecting the Nano and Macro Worlds

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There is considerable debate on how to fabricate at the nanoscale – can traditional top-down microfabrication be extended to the nanoscale or will self-assembly approaches be required? We are examining the potential of chitosan to offer new opportunities for assembling nanoscale-components into larger, functional structures. Specifically, chitosan offers three unique properties. Chitosan is reactive and this facilitates the grafting of components onto the polysaccharide's backbone or the crosslinking of chitosan chains. Chitosan is pH-responsive and undergoes a soluble-to-insoluble transition in response to small changes in pH. Finally, chitosan is gel-forming and this allows the generation of stable films. We will review recent efforts from our and other groups to employ chitosan's properties to assemble nanoparticles (proteins, carbon nanotubes and quantum dots) into functional composites. We will also report newer efforts to connect vesicles into three-dimensional networks.