Nanobiotechnology approach to fabricate polycaprolactone nanofibers containing solid titanium nanoparticles as future implant materials - DTU Orbit (18/12/2018)

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In this study, a good combination of electrospun poly(caprolactone) nanofibers incorporated with high purity titanium nanoparticles is introduced for hard tissue engineering applications. A simple approach to utilize the colloidal properties of poly(caprolactone) and titanium nanoparticles are exploited to form nanofibers by the simple electrospinning process. The prepared colloidal solutions were characterized using dynamic light scattering and electrophoratic light scattering which indicated unimodal size distribution and negative zeta potential. To investigate the bioactivity of the resultant nanofiber mats, they were incubated in simulated body fluid at 37 °C for 10 days. Field emission scanning electron microscopy in combination with energy-dispersive X-ray spectroscopy indicated that incorporation of titanium strongly activates precipitation of the apatite-like materials from the utilized simulated body fluid. Moreover, in-vivo experiments using experimental dogs revealed that nanofibers can yield good tissue regeneration on the surfaces of nanofibers.

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