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Additive electrospraying for scaffold functionalization

(Book Chapter)

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Abstract

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In the last decade, micro- and nanostructured platforms with interesting features as bioactive carriers have been fabricated by the deposition of electrospun fibers exhibiting extended surface area and high molecular permeability associated with fully interconnected pore architecture, thus creating the opportunity to incorporate a wide range of actives/drugs for different use. In these systems, molecular release may occur via various molecular transport pathways, namely diffusion, desorption, and scaffold degradation, which may be tuned through a careful control of fiber morphology and composition. Recent studies have demonstrated that several shortcomings involve the possibility to incorporate bioactive species, not exposing molecules to fast and/or uncontrolled denaturation, thus preserving biochemical and biological fiber functionalities.In this context, additive electrospraying, namely the integration of electrosprayed nanoparticles into electrospun fiber network, is emerging as a really interesting route to control "separately release and functional properties of the scaffolds in order to support cell activities by independent cues, during the tissue formation.Herein, we propose an overview of current progresses in the use of electrospraying and/or electrospinning for tissue engineering and molecular release. Our main objective is oriented to identify the most innovative integrated approaches recently optimized for scaffold functionalization to molecularly encode multicomponent platforms in order to obtain a spatial and time controlled release.

Author keywords

Coating | Electrofluidodynamic technologies | Electrospraying | Nanoparticles | Polydispersity | Scaffold functionalization

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