

ELECTROSPUN PREPARATION AND APPLICATION OF BIODEGRADABLE ORGANIC-INORGANIC NANOCOMPOSITE BIOMEDICAL MEMBRANE

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By electrospinning technology, the fiber membrane can be prepared with a high surface area to volume ratio and interconnected pore structure, which are beneficial for cellular attachment, proliferation and migration to form new tissue. It displays potential applications in tissue engineering, tissue regeneration, wound dressing and drug delivery system. Moreover, the organic-inorganic nanocomposite fiber membrane consisting of organic component such as sodium alginate (SA), polyvinyl alcohol(PVA) and polylactic acid (PLA) and inorganic component such as hydroxyapatite (HAP) and beta-tricalcium phosphate (β -TCP) normally shows improved mechanical and biological properties. Herein, the PVA/SA/nano-HAP and PLA/nano-HAP composite fiber membrane were prepared by electrospinning. The effect of nano-HAP on the morphology and mechanical property of composite fiber membranes was investigated. The biological properties including hemolysis, cytotoxicity, cell adhering and proliferation of composite fiber membrane were evaluated. Results show that the electrospun composite membranes show good fiber morphology, homogeneous incorporation and distribution of nHAP in fibers. The incorporation of nano-HAP of 1.64 wt.% in PVA/SA/nHAP fiber membrane and 4 wt.% in PLA/nHAP fiber membrane significantly improve the tensile strength with about 45% enhancement and 22% enhancement, respectively. The composite fiber membrane has good biocompatibility and cells can be proliferated well on composite fiber membrane. It can be expected that the obtained organic-inorganic composite fiber membranes can be used as tissue regenerative materials

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