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# Preparation and characterization of electrospun PLA/PU bilayer nanofibrous membranes for controlled drug release applications

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## ABSTRACT

Composite bilayer nanofibrous membranes of polylactic acid (PLA)/polyurethane (PU) were prepared by electrospinning, which can be used as wound dressing scaffolds for controlled drug loading and release. Besides, doxorubicine (DOX) and paeonolum, which had been successfully electrospun into nanofibers, were employed as the model of antitumor drugs to electrospin with in the nanofibrous membranes. The properties of the membranes were characterized by scanning electron microscope (SEM), atomic force microscopy (AFM), Fourier transform infrared spectrum (FTIR), X-ray diffraction (XRD) and differential scanning calorimetry (DSC). Furthermore, the releasing profiles of drug from the PLA/PU electrospun nanofibrous membrane were investigated by UV-visible spectrophotometer. It was shown that the drugs on the scaffolds were released when the composite nanofibrous membranes were decomposing, which was related to the molecular weight of polymers, the mass ratio of CS to PEO, the total concentration of polymers and the pH value of solution. Therefore, possible mechanisms of controlled drug release were anticipated. A unique bilayer nanofibrous membrane was prepared in this study.

## ARTICLE HISTORY

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## KEYWORDS

electrospinning; nanofibrous membranes; controlled drug release; scaffold

## 1. Introduction

Electrospinning as a novel nanofiber-producing technology has got attractive attentions over the past two decades [1, 2]. The non-woven mats of polymer fibers with diameters ranging from a few microns to less than 100 nm has various applications, such as nanofiltration [3–5], catalytic carrier [6, 7], fibrous-sensor applications [8,9], tissue engineering [10–12] and drug delivery [13–15], which are on the basis of its characteristic in three-dimensional structure, small size of nanoparticles, large surface area, small aperture, biocompatibility, perfect mechanical properties [16, 17]. The most appealing one is to pattern nature extracellular matrix (ECM) in tissue engineering field, thus, the nanofibrous membrane is promising to be used as wound dressings, especially chemotherapy after surgery.

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