# Nanostructured Membranes produced by Solution Blow Spinning for controlled drug delivery

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## SUMMARY

The main objective of skin tissue engineering is the regeneration of injuries, seeking the recovery of the structural and functional integrity of the damaged tissue. Wound dressing based on nanostructured fibers with active materials is considered a potential strategy for accelerating the wound healing process and for the reconstitution and repair of compromised skin. The Solution Blow Spinning (SBS) technique has attracted the attention due to the production of nanofiber mats in a continuous process, exhibiting high porosity, similarity with the tissues´ extracellular matrix and the ability of drug local delivery. Thus, in this work polycaprolactone (PCL) / polyethylene glycol (PEG) fibers loaded with ibuprofen, a fast-acting analgesic with antipyretic and anti-inflammatory action, were developed for application as wound dressings, aiming to assist in the tissue healing process while providing comfort to the patient. Initially, fibers were produced from PCL solutions in chloroform at 8% (w/v) and PCL/PEG solutions in mass ratios of 2:1 and 1:1. The influence of the concentration of PEG, the gas pressure (compressed air) and the solution injection rate on fibers morphology was evaluated by Scanning Electron Microscopy (SEM). After the microstructural analysis of PCL/PEG fibers, a suitable condition was selected (1:1, 20 psi and 7.2 ml/h) for the fabrication of membranes containing ibuprofen at different proportions (10-60% by mass of PCL). Ibuprofen-loaded PCL/PEG membranes composed of submicron fibers

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was obtained. However, at high concentrations, the addition of ibuprofen destabilized the system, increasing the presence of beads and tangles on the structure. The membranes proved to be bead-on-string structured with beads present along the fibers for all conditions used. The release profile showed a continuous and stable release rate during all the incubation time. The controlled drug delivery profile and the high swelling capacity of the membranes indicate the potential of the SBS technique in the manufacture of suitable wound dressing associated to drug delivery systems.

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