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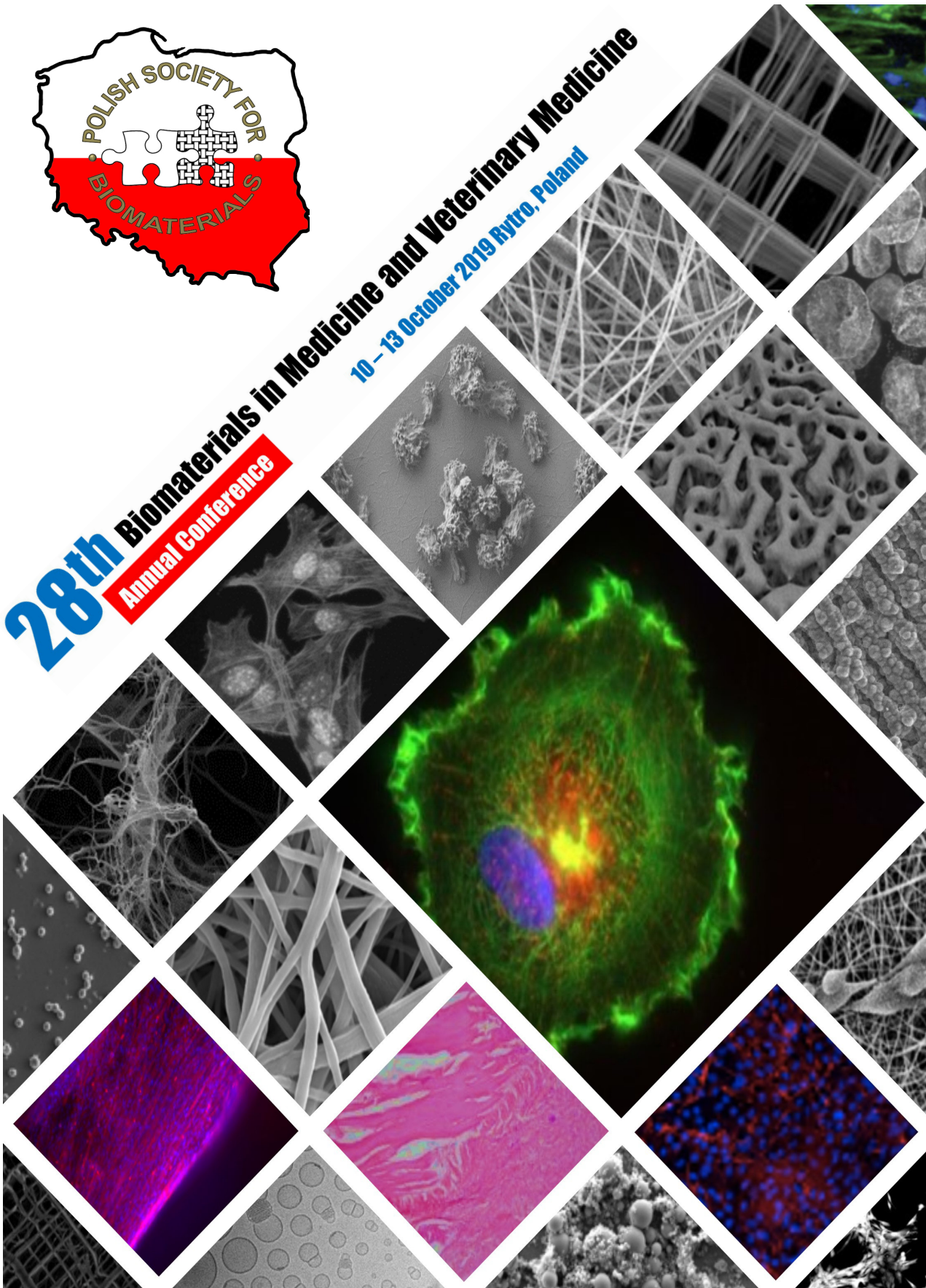

# CHARACTERIZATION OF BICOMPONENT POLYCAPROLACTONE/GELATIN ELECTROSPUN NANOFIBRES CROSSLINKED WITH EDC/NHS

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## Introduction

Combination of synthetic and natural polymers for tissue engineering purposes has been proved to be advantageous for both designing optimal mechanical properties as well gaining bioactivity that widely used aliphatic polyesters lack [1, 2]. However, due to gelatin's proneness to dissolution in aqueous environment of human body, the benefits of its presence in bicomponent electrospun polycaprolactone/gelatin nanofibres could be short-lived [3]. Our approach to diminish this shortcoming is to crosslink gelatin within the fibre. We believe crosslinking with EDC/NHS does not cause any cytotoxicity and at the same time preserves material's properties.

## Materials and Methods

A set of materials of different PCL to gelatin ratios were electrospun from solutions consisting of PCL (Mw = 80 kDa) and gelatin (300 bloom) dissolved in acetic and formic acid (9:1) mixture and in HFIP. PCL to gelatin ratios ranged from 9:1 to 1:1. EDC/NHS concentrations were set from 0,23%/0,12% to 0,02%/0,01%, with reaction times ranging from 1 to 9 hours. EDC and NHS were dissolved in ethanol and water in 7:3 w/w ratio. All samples underwent biodegradation studies for 1, 7 and 30 days in 37°C in PBS.
Samples were characterized by gelatin weight loss measurement, scanning electron microscopy, uniaxial tensile testing and cellular response studies.

## Results and Discussion

Rapid gelatin loss was observed for all samples, the higher gelatin content the faster it progressed. Groove-like sites after gelatin leaching were clearly visible in SEM images of non-crosslinked samples after biodegradation test (FIG. 1b).
Judging both morphology, as well as mass loss of the samples, all chosen concentration/time crosslinking conditions were effectively preventing extensive gelatin depletion.

## Conclusions

Excellent results in retaining fibres' morphology and gelatin content after 30 days of biodegradation can be achieved with crosslinking for just 1h using moderate EDC/NHS concentrations (FIG. 1c).
It was shown that EDC/NHS crosslinking method is a fast, effective and cheap way of preserving gelatin within the fibre and making sure the benefits of its use are lasting.

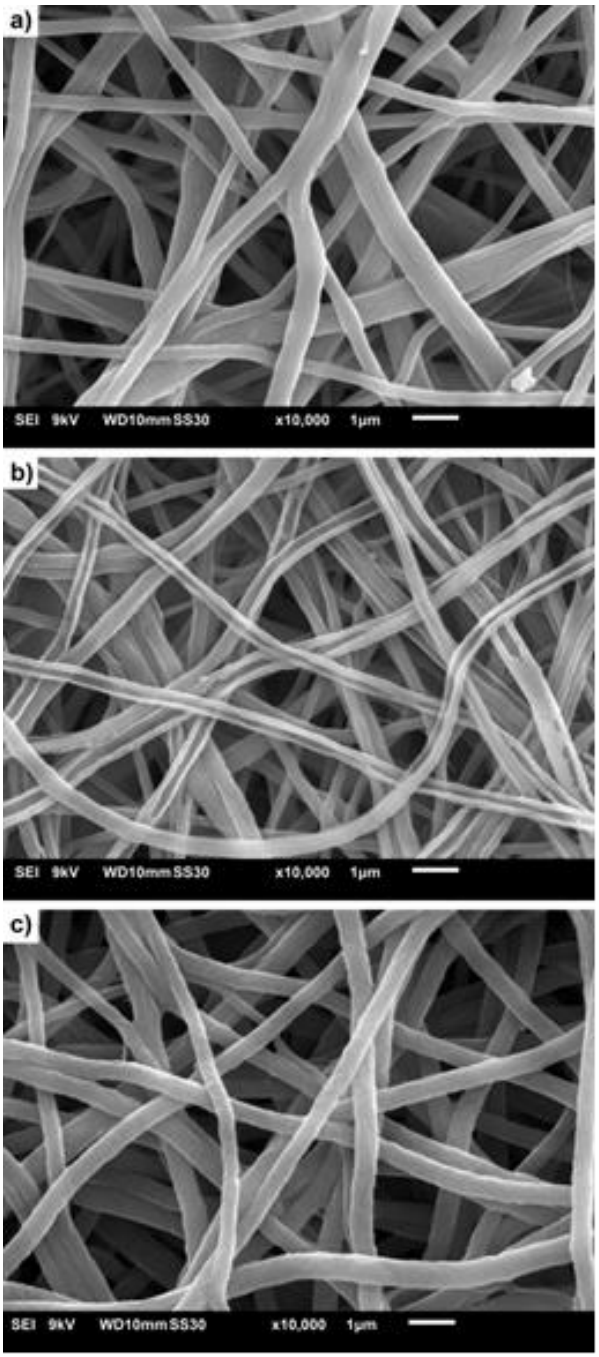


FIG. 1. Electrospun PCL/gelatin 7:3 material from acetic and formic acid mixture: a) not crosslinked, before biodegradation test; b) not crosslinked, after 30 days of biodegradation test; c) crosslinked, after 30 days of biodegradation test.

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