Supplementary Information

Nanofibrous polylactide composite scaffolds with electroactivity and sustained release capacity for tissue engineering

Jing Chen a,b, Juan Ge a, Baolin Guo a,* , Kun Gao c, Peter X. Ma a,d,e,f,*

a Frontier Institute of Science and Technology, and State Key Laboratory for Mechanical Behavior of Materials, Xi’an Jiaotong University, Xi’an, 710049, China
b Xi’an Modern Chemistry Research Institute, Xi’an, 710065, China
c State Key Laboratory for Manufacturing Engineering, Xi’an Jiaotong University, Xi’an, 710049, China
d Department of Biomedical Engineering, University of Michigan, Ann Arbor, MI 48109, USA
e Department of Biologic and Materials Sciences, University of Michigan, 1011, North University Ave., Room 2209, Ann Arbor, MI 48109, USA
f Macromolecular Science and Engineering Center, University of Michigan, Ann Arbor, MI 48109, USA

* To whom correspondence should be addressed. Tel.: +86-29-83395363. Fax: +86-29-83395131. E-mail: baoling@mail.xjtu.edu.cn, mapx@umich.edu.
Experimental

XRD, FT-IR, and UV-vis measurement

The X-ray diffraction (XRD) measurements for drugs and nanoparticles were performed on a Rigaku SmartLab (3) X-ray diffractometer at room temperature.

FT-IR spectra of ibuprofen, rutin and the drug-loaded PUU nanoparticles were obtained with a Nicolet 6700 FT-IR spectrometer (Thermo Scientific Instrument) in the 4000-600 cm\(^{-1}\) range. The spectra were taken as the average of 32 scans at a resolution of 4 cm\(^{-1}\).

The UV-visible spectra of ibuprofen, rutin and the drug-loaded PUU nanoparticles in DMF solution were obtained from a UV-vis spectrophotometer (PerkinElmer Lambda 35).

Degradation method of PUU nanoparticles

PUU nanoparticles were electrosprayed onto tinfoil. For enzymatic degradation experiment, the tinfoil was cut into square pieces (3 × 3 cm\(^2\)) and weighted. Tris/HCl buffer (pH 8.6 at 37 °C) was prepared from water solution of Tris base and hydrochloric acid. 0.02 wt% of sodium azide was dissolved in the buffer. Each sample was immersed in a vial of 5 mL Tris/HCl buffer containing 1 mg of proteinase K. The vials were placed in a 37 °C shaker with rotating speed of 100 rpm. The buffer and proteinase K were replaced every 24 h to maintain the activity. Specimens were withdrawn at predetermined time, washed with deionized water, dried in an oven at 50 °C overnight and vacuum dried for 2 d to remove moisture. Dry specimens were weighed and weight loss was calculated by the following formulation:
Weight loss (%) = \((W_0 - W_t)/W_0\)

Where \(W_0\) stands for the original weight of PUU nanoparticles. \(W_t\) is the dry weight of specimen during degradation.

**Figures**

![Graph showing weight loss over time](image1.png)

Figure S1. The degradation profile of PUU nanoparticles at 37 °C in enzymatic environment.

![SEM images](image2.png)

Figure S2. SEM images of (A): random PLA nanofibers/PLA nanoparticles, and (B): aligned PLA nanofibers/PLA nanoparticles. Scale bar = 20 μm.
Figure S3. XRD patterns of model drugs and drug-loaded PUU nanoparticles.

Figure S4. UV-vis (A, B) and FT-IR (C, D) spectra of model drugs and drug-loaded PUU nanoparticles.
Figure S5. Molecular structures of ibuprofen and rutin.