

Biodegradable and bioresorbable nonwovens based on poly(1,3-propanediol citrate) for ex-vivo cell culturing

Aleksandra BANDZEREWICZ¹, Kamil WIERZCHOWSKI², Piotr DENIS³, Maciej PILAREK², Agnieszka GADOMSKA-GAJADHUR¹

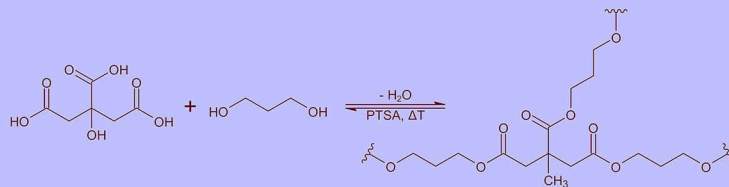


¹Faculty of Chemistry, Warsaw University of Technology, Warsaw, Poland

²Faculty of Chemical and Process Engineering, Warsaw University of Technology, Warsaw, Poland

³Laboratory of Polymers and Biomaterials, Institute of Fundamental Technological Research Polish Academy of Sciences, Warsaw, Poland

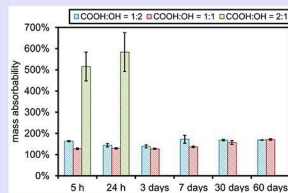
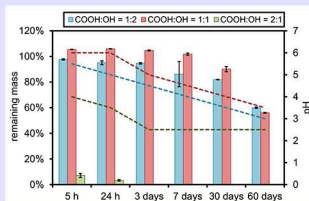
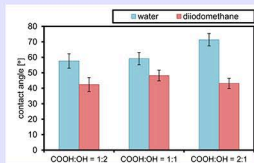
THE OBJECTIVE was to synthesise a new material, poly(1,3-propanediol citrate), determine optimal conditions for the synthesis and to produce and characterise porous biodegradable scaffolds for cell cultures.



Polymer films

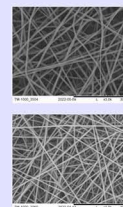
prepared by thermal crosslinking:
130°C, 24h

| COOH:OH molar ratio of poly(1,3-propanediol citrate) | | | |
|--|------|-------|------|
| | 1:2 | 1:1 | 2:1 |
| gel content [%] | 95±2 | 100±1 | 84±3 |

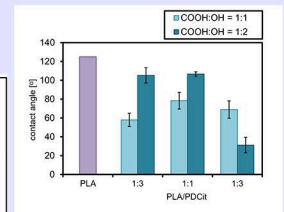
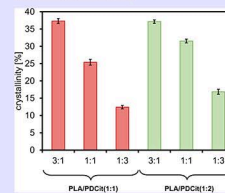


Electrospun nonwovens

made from poly-L-lactide and poly(1,3-propanediol citrate) (PDCit, COOH:OH 1:2 and 1:1); the mass content of PDCit was 25% (3:1 PLA/PDCit), 50% (1:1 PLA/PDCit) and 75% (1:3 PLA/PDCit)

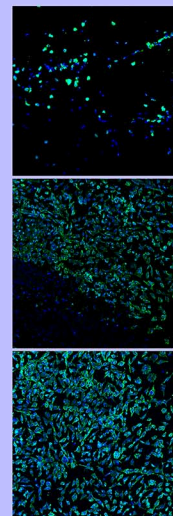
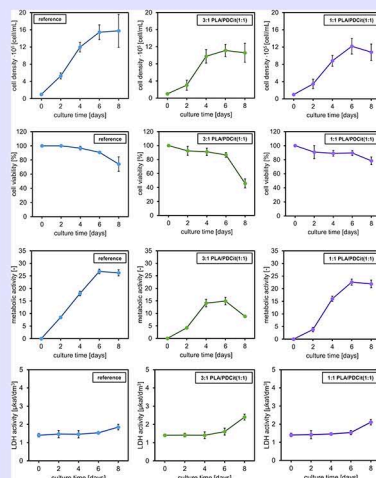
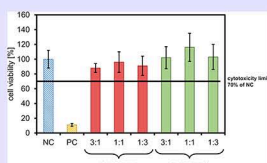


| PLA/PDCit | COOH:OH molar ratio of poly(1,3-propanediol citrate) | | | |
|-----------|--|-----------------------|----------------|-----------------------|
| | 1:1 | | 1:2 | |
| | elongation [%] | Young's modulus [MPa] | elongation [%] | Young's modulus [MPa] |
| 3:1 | 136.5±5.5 | 13.3±1.9 | 111.5±3.5 | 7.5±0.1 |
| 1:1 | 93.0±4.0 | 3.3±0.5 | 72.0±2.0 | 3.1±0.1 |
| 1:3 | 16.0±0.5 | 1.0±0.1 | 35.0±4.0 | 1.0±0.0 |



Cytotoxicity and cell cultures

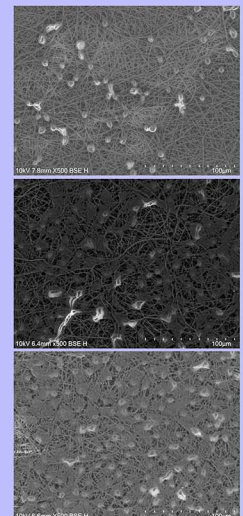
nonwovens;
L929 cells
(mouse fibroblasts)



day 0

day 4

day 6



This scientific research was financed from the budgetary funds of The Excellence Initiative - Research University programme (BIOTECHMED-3 - Advanced) - "Biomimetic, biodegradable cell scaffolds for the differentiation of stem cells into osteoblasts and chondrocytes (SteamScf)".