Micro-compounding of porous PLA/organoclay nanocomposite scaffolds

introduction

A commonly applied definition of tissue engineering, as stated by Dr. Vacanti, is:

"an interdisciplinary field that applies the principles of engineering and life sciences toward the development of biological substitutes that restore, maintain, or improve tissue function or

-to examine the applicability of micro-compounding and micro-injection

molding as a processing tool for tissue engineering PLA/Nanocomposite



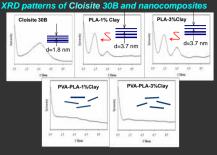
Biodegradability

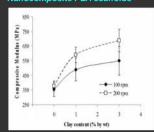
Porosity & Interconnectivity

Surface chemistry Mechanical properties

Scaffold Design & Production: "POLYMER ENGINEERING"

results & discussion





Burning test

Material (PLA/PVA/Clay)	Residual Inorganic Material Content (%) After Burning Test		
	Before PVA leaching	After PVA leaching	
		Theoretical*	Experimental"
50/50/1	0.73	1.41	0.92
50/50/3	2.15	4.33	2.81

- To check how much clay is dispersed in PVA phase



scaffolds Approach:

The objective of the study is:

Reinforcement:

Porogen: NaC

Interconnectivity: PV/

Advantages:

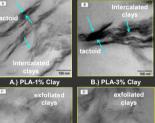
-Quick and easy processing

-possible to obtain complex shapes

-no toxic materials

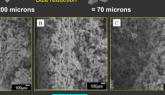
TEM micrographs of scaffold

SEM micrographs of scaffold



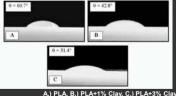
C.) PVA/PLA-1%Clay D.) PVA/PLA-3%Clay













A.) 0%-Clay, B.) 1%-Clay, C.) 3%-Clay

conclusions

-The interconnected-porous PLA/Nanocomposite scaffolds were successively processed with micro-

-Due to high shear in the micro-compounder, the NaCl particles were broken into nonuniform small pieces -Increasing clay content improved the water wettability of the nanocomposites

experimental

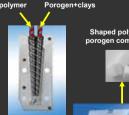


ganic Modifier:

isite 30B MMT СН2СН2ОН CH2CH2OH

+¢H—CH₂ |_n

NaCl, Particle size: 150-350 micron



Particle leaching in Shaped polymer-porogen composite water to obtain porous scaffold

-Polymer Matrix: 50% PLA - 50% PVA by weight -Reinforcement: 0, 1 and 3% Clay by weight

Nanocomposite-Scaffolds

-Polymer Matrix: 50% PLA - 50% PVA by weight -Porogen: 70% NaCl by weight

Reinforcement: 0, 1 and 3% Clay by weight

-Micro-compounding for 3 min, and subsequently

-Porogen leaching for 72 h





