

Accepted Manuscript

Reinforcing properties of bacterial polyester with different cellulose nanocrystals via modulating hydrogen bonds

Hou-Yong Yu, Ju-Ming Yao



PII: S0266-3538(16)31401-4

DOI: [10.1016/j.compscitech.2016.10.004](https://doi.org/10.1016/j.compscitech.2016.10.004)

Reference: CSTE 6535

To appear in: *Composites Science and Technology*

Received Date: 7 January 2016

Revised Date: 31 July 2016

Accepted Date: 5 October 2016

Please cite this article as: Yu H-Y, Yao J-M, Reinforcing properties of bacterial polyester with different cellulose nanocrystals via modulating hydrogen bonds, *Composites Science and Technology* (2016), doi: 10.1016/j.compscitech.2016.10.004.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Reinforcing properties of bacterial polyester with different cellulose nanocrystals via modulating hydrogen bonds

Hou-Yong Yu^{a*,b}, Ju-Ming Yao^{a,b*}

^a *The Key Laboratory of Advanced Textile Materials and Manufacturing Technology of Ministry of Education, College of Materials and Textile, Zhejiang Sci-Tech University, Hangzhou 310018, China*

^b *National Engineering Lab for Textile Fiber Materials & Processing Technology, Zhejiang Sci-Tech University, Hangzhou 310018, China.*

ABSTRACT: This work provides a direct evidence to investigate relationship between hydrogen bonding interactions and property enhancement of cellulose nanocrystals (CN) based bionanocomposites. Cellulose nanocrystal citrates (CN-C) with more hydroxyl (O-H) and carboxyl groups, CN and cellulose nanocrystal formates (CN-F) with less O-H groups were extracted from commercial microcrystalline cellulose using citric/hydrochloric acids, hydrochloric acid and formic/hydrochloric acids, respectively. Then different nanocrystals were incorporated into bacterial polyester poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV) for tuning hydrogen bonding interactions and properties of PHBV nanocomposites. As expected, at the same loading contents, CN-C had stronger reinforcing capability on PHBV matrix than CN and CN-F. Compared to neat PHBV, tensile strengths of 10 % CN-F/PHBV, 10 % CN/PHBV and 10 % CN-C/PHBV were improved by 146 %, 166 % and 187 %, respectively. Especially, the maximum decomposition temperature of 10 % CN-C/PHBV was increased by 48.1 °C, and this nanocomposite showed superior barrier properties with a 64% reduction in water vapour permeability (WVP). Besides, the

^{a*}Corresponding author. Tel.: 86 571 86843618; fax: 86 571 86843619.

E-mail addresses: phdyu@zstu.edu.cn (Hou-Yong Yu); yaoj@zstu.edu.cn (Ju-Ming Yao)

Download English Version:

<https://daneshyari.com/en/article/5022414>

Download Persian Version:

<https://daneshyari.com/article/5022414>

[Daneshyari.com](https://daneshyari.com)