

## Accepted Manuscript

Role of nano silica in supercritical CO<sub>2</sub> foaming of thermoplastic poly(vinyl alcohol) and its effect on cell structure and mechanical properties

Jiacheng Sun, Jinke Xu, Zhilong, He, Huiyan Ren, Yaqi Wang, Li Zhang, Jin-Biao Bao

PII: S0014-3057(18)30890-5

DOI: <https://doi.org/10.1016/j.eurpolymj.2018.06.009>

Reference: EPJ 8445

To appear in: *European Polymer Journal*

Received Date: 16 May 2018

Revised Date: 4 June 2018

Accepted Date: 9 June 2018

Please cite this article as: Sun, J., Xu, J., Zhilong, He, Ren, H., Wang, Y., Zhang, L., Bao, J-B., Role of nano silica in supercritical CO<sub>2</sub> foaming of thermoplastic poly(vinyl alcohol) and its effect on cell structure and mechanical properties, *European Polymer Journal* (2018), doi: <https://doi.org/10.1016/j.eurpolymj.2018.06.009>

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.



Role of nano silica in supercritical CO<sub>2</sub> foaming of thermoplastic poly(vinyl alcohol)  
and its effect on cell structure and mechanical properties

Jiacheng Sun, Jinke Xu, Zhilong He, Huiyan Ren, Yaqi Wang, Li Zhang\*, Jin-Biao Bao

Ningbo Key Laboratory of Specialty Polymers, Faculty of Materials Science and Chemical Engineering, Ningbo University, Ningbo 315211, China

#### **ABSTRACT:**

Microcellular poly(vinyl alcohol) (PVA) foams were prepared by combining the thermoplastic processing technology and solid-state supercritical CO<sub>2</sub> foaming technology. The compound polyol plasticizers that may partially destroy intra- and inter-molecular hydrogen bonding within PVA and improve the flowability during processing were developed to pave the way for PVA thermoplastic processing with lower processing temperature and wider processing window. In order to ease the collapse of bubbles and improve the foaming performances, nano silica was introduced into the system. The influences of processing parameters (foaming temperature and saturation pressure) and nano silica content on the foaming behavior and cell structure were systematically studied. The resultant PVA/SiO<sub>2</sub> nanocomposite foams exhibited a cellular structure with smaller cell size, larger cell density and relative density compared to PVA foam. It was also found that cell density increased with decreasing foaming temperature or increasing saturation pressure. Further investigation suggested that improvement of stiffness as well as the decrease of crystallinity were thought as the main reasons to explain the interesting effect of SiO<sub>2</sub> addition on the foaming behavior of PVA.

**KEYWORDS:** Thermoplastic processing; Poly (vinyl alcohol) Foam; Nano silica; Supercritical Carbon Dioxide

#### **1 INTRODUCTION**

Polymeric foams have attracted wide interests ranging from industry to academic research due to their excellent properties containing lightweight, impact strength and thermal insulation. Commonly used polymeric foams are usually made from

---

\* To whom correspondence should be addressed. Tel.: +86-0574-87609986, Fax: +86-0574-87609986, E-mail address: zhangli2@nbu.edu.cn

Download English Version:

<https://daneshyari.com/en/article/7803488>

Download Persian Version:

<https://daneshyari.com/article/7803488>

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