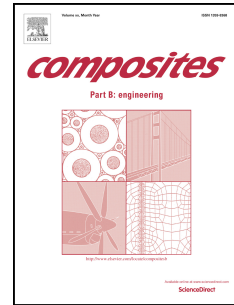


Accepted Manuscript

Preparation and characterization of natural rubber composites highly filled with brewers' spent grain/ground tire rubber hybrid reinforcement

Łukasz Zedler, Xavier Colom, Mohammad Reza Saeb, Krzysztof Formela



PII: S1359-8368(18)30251-8

DOI: [10.1016/j.compositesb.2018.03.024](https://doi.org/10.1016/j.compositesb.2018.03.024)

Reference: JCOMB 5583

To appear in: *Composites Part B*

Received Date: 23 January 2018

Accepted Date: 13 March 2018

Please cite this article as: Zedler Ł, Colom X, Saeb MR, Formela K, Preparation and characterization of natural rubber composites highly filled with brewers' spent grain/ground tire rubber hybrid reinforcement, *Composites Part B* (2018), doi: 10.1016/j.compositesb.2018.03.024.

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.

1 **Preparation and characterization of natural rubber composites highly filled with**
2 **brewers' spent grain/ground tire rubber hybrid reinforcement**

3
4 Łukasz Zedler^a, Xavier Colom^b, Mohammad Reza Saeb^c, Krzysztof Formela^{a*}

5
6 ^aDepartment of Polymer Technology, Faculty of Chemistry, G. Narutowicza Str. 11/12,
7 Gdańsk University of Technology, 80-233 Gdansk, Poland

8 ^bUniversitat Politècnica de Catalunya Barcelona Tech, Department of Chemical
9 Engineering, Colom 1, 08222-Terrassa, Barcelona, Spain

10 ^cDepartment of Resin and Additives, Institute for Color Science and Technology, P.O.
11 Box: 16765-654, Teheran, Iran

12 *Corresponding author: Krzysztof Formela, e-mail: krzysztof.formela@pg.gda.pl ,
13 kformela.ktp@gmail.com , Tel. No.: +48 58 347 2234/ Fax. No.: +48 58 347 2134

14 **Abstract**

15 Brewers' spent grain (BSG) and ground tire rubber (GTR) were applied as low-cost
16 hybrid reinforcement natural rubber (NR). The impact of BSG/GTR ratio (in range:
17 100/0, 75/25, 50/50, 25/75 and 0/100 phr) on processing and performance properties of
18 highly filled natural rubber composites was evaluated by oscillating disc rheometer,
19 Fourier-transform infrared spectroscopy, thermogravimetric analysis, scanning electron
20 microscopy, swelling behavior, tensile tests and impedance tube measurements. It was
21 found that increasing content of GTR in NR/BSG/GTR composites accelerate cross-
22 linking reactions during their preparation, which resulted in decrease of scorch time and
23 optimal cure time. Simultaneously, higher content of GTR filler in NR/BSG/GTR
24 composites significantly improved their physico-mechanical, thermal, morphological
25 and acoustical properties. This indicates better compatibility between natural rubber
26 matrix and GTR than with BSG, which is related to correlation between two factors.
27 First factor is obvious differences in particles size and polarity of GTR and BSG, which
28 affected physical interactions into phase boundary between NR matrix and BSG/GTR
29 hybrid reinforcement. Second factor is possible migration of unreacted curing additives
30 and carbon black particle from GTR filler to NR matrix, which played a significant role
31 on processing and final properties of NR/BSG/GTR composites.

32
33 **Keywords:** Brewers' spent grain; Ground tire rubber; Natural rubber; Biocomposites;
34 Structure-property relationships

Download English Version:

<https://daneshyari.com/en/article/7212026>

Download Persian Version:

<https://daneshyari.com/article/7212026>

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