

Author's Accepted Manuscript

Nanoparticle chemically end-linking elastomer network with super-low hysteresis loss for fuel-saving automobile

Jun Liu, Zijian Zheng, Fanzhu Li, Weiwei Lei, Yangyang Gao, Youping Wu, Liqun Zhang, Zhong Lin Wang



PII: S2211-2855(16)30290-7
DOI: <http://dx.doi.org/10.1016/j.nanoen.2016.08.002>
Reference: NANOEN1415

To appear in: *Nano Energy*

Received date: 15 March 2016
Revised date: 1 August 2016
Accepted date: 1 August 2016

Cite this article as: Jun Liu, Zijian Zheng, Fanzhu Li, Weiwei Lei, Yangyang Gao, Youping Wu, Liqun Zhang and Zhong Lin Wang, Nanoparticle chemically end-linking elastomer network with super-low hysteresis loss for fuel-saving automobile, *Nano Energy*, <http://dx.doi.org/10.1016/j.nanoen.2016.08.002>

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 galley proof before it is published in its final citable 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.

Nanoparticle chemically end-linking elastomer network with super-low hysteresis loss for fuel-saving automobile

Jun Liu¹, Zijian Zheng¹, Fanzhu Li¹, Weiwei Lei¹, Yangyang Gao¹, Youping Wu¹,

Liqun Zhang^{1,2*}, Zhong Lin Wang^{3,4*}

¹Key Laboratory of Beijing City on Preparation and Processing of Novel Polymer Materials, Beijing University of Chemical Technology, 100029 Beijing, People's Republic of China

²State Key Laboratory of Organic-Inorganic Composites, Beijing University of Chemical Technology, 100029 Beijing, People's Republic of China

³Georgia Institute of Technology, School of Materials Science and Engineering, Atlanta, GA 30332 USA

⁴Chinese Academy of Science, Beijing Institute of Nanoenergy and Nanosystem, 100083 Beijing, People's Republic of China

Abstract

Achieving energy sustainability has imposed a great challenge to improve fuel efficient vehicles. Tires, to overcome the rolling resistance, are responsible for a rather large fraction of energy consumed by vehicles, and a 10% reduction in the rolling resistance corresponds to a 2% decline in the fuel consumption, which, for instance, would save 1 to 2 billion gallon of fuel per year consumed by the entire passenger vehicle fleet in the United States. From the materials' perspective, the key bottleneck to lower the rolling resistance of tires lies in designing a novel kind of advanced elastomeric polymer nanocomposites tailored for tire tread, with remarkably low dynamic hysteresis loss (DHL). Here we show that, a nanoparticle chemically end-linking elastomer network, with nanoparticles (NPs) acting as netpoints to chemically connect the dual end-groups of each polymer chain to form a network, exhibits excellent static and dynamic mechanical properties of super-low DHL. The DHL is reduced for ~50% compared to silica NPs filled elastomer that is conventionally used for tire tread. By taking advantage of a library of other

*Corresponding author: zhanglq@mail.buct.edu.cn or zhong.wang@mse.gatech.edu

Download English Version:

<https://daneshyari.com/en/article/7953136>

Download Persian Version:

<https://daneshyari.com/article/7953136>

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