

Author's Accepted Manuscript

Grafting poly(vinyl alcohol) onto polybutadiene rubber latex particles by pre-irradiation

Bo Tian, Wei Dong, Yuguang Liu



PII: S0969-806X(17)30162-7
DOI: <http://dx.doi.org/10.1016/j.radphyschem.2017.02.021>
Reference: RPC7423

To appear in: *Radiation Physics and Chemistry*

Received date: 18 August 2016
Revised date: 20 December 2016
Accepted date: 8 February 2017

Cite this article as: Bo Tian, Wei Dong and Yuguang Liu, Grafting poly(vinyl alcohol) onto polybutadiene rubber latex particles by pre-irradiation, *Radiation Physics and Chemistry*, <http://dx.doi.org/10.1016/j.radphyschem.2017.02.021>

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.

Grafting poly(vinyl alcohol) onto polybutadiene rubber latex particles by pre-irradiation

Bo Tian^a, Wei Dong^{a,b,c}, Yuguang Liu^{a,b,*}

^aTechnical Physics Institute of Heilongjiang Academy of Sciences, Harbin, 150086, China

^bInstitute of Advanced Technology of Heilongjiang Academy of Sciences, Harbin, 150020, China

^cHarbin University of Science and Technology, Harbin, 150080, China

*Corresponding author: Yuguang Liu; Tel: (+86) 0451-86693457; (Fax) :(+86) 0451-86694185; E-mail : ygliu_63@163.com

Abstract

Poly(vinyl alcohol) (PVA) was grafted on polybutadiene rubber latex (PBL) particles (PB-g-PVA) by pre-irradiation via emulsion grafting copolymerization. The grafting degree (G%) increased almost linearly with the reaction time and the weight ratio of PVA to the PB latex, while decreased gradually when the irradiation dose is over 30kGy and the reaction temperature is higher than 60°C. The grafting efficiency (GE%) has the same trend of the G% but the weight ratio of PVA to PBL, GE% decreased with increasing of PVA adding to PB latex. FTIR spectroscopy indicated that the PVA was grafted onto the PB particles. The dynamic light scattering measurement showed that the particle size of PB-g-PVA particles was larger than that of the pristine PBL particles, and it increased with increment of G%. Transmission electron microscopy images of the PB-g-PVA latex particles demonstrated that the size of PB-g-PVA particle was enlarged by the layer of grafted PVA surrounding the PBL particles. Thermal behavior exhibited the phase separation in the PB-g-PVA films, T_{g1} and T_{g2} related to the PB and PVA respectively, both of which shifted to a higher temperature with increasing of G%, but the T_{g2} was still lower than that of the virgin PVA. The increment of the surface free energy of PB-g-PVA films was attributed to the incorporation of the polar PVA, which also resulted in improvement of the hydrophilic properties.

Keywords: Polybutadiene rubber latex; Poly(vinyl alcohol); Pre-irradiation; Grafting copolymerization.

1 Introduction

Rubbers, both natural and synthetic rubber, are extensively used as modification agents for improving toughness of the brittle polymer materials besides tire industry. However, natural rubber (NR), polybutadiene (PBR), polyisoprene (PIPR) and styrene-butadiene rubber (SBR) etc. often need modified to enhance interfacial adhesion and to reduce the dispersed domain size in blending with either polar polymer or crystalline polymer like polyamide (Nylon), epoxy resin, polyvinyl chloride (PVC) and polypropylene for improvement of the toughness efficiency. Copolymerization has been a unique method for altering rubber molecularly both in solution and in latex forms [Arayapraneet al., 2002a; Wongthep et al., 2013; Sa-Ad Riyajana et al., 2012; Lehrle and Willist, 1997; Siti et al., 2008; Enyiegbulam and Aloka, 1992]. The copolymerization in the latex has the merit and

Download English Version:

<https://daneshyari.com/en/article/5499230>

Download Persian Version:

<https://daneshyari.com/article/5499230>

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