Thesis Title The Preparation and Characterization of Poly(1,4-butadiene-b-cis-1,4-isoprene)
Name Arunee Kongdee
Degree Master of Science (Polymer Science)
Thesis Supervisory Committee
Saran Poshyachinda, Ph.D.
Krisda Suchiva, Ph.D.
Pranee Phinyocheep, Doctorat de l' Universite' du Maine
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ABSTRACT

Poly(1,4-butadiene-b-cis-1,4-isoprene) was prepared anionically by sequential addition of monomer using n-butyllithium as initiator in cyclohexane. The molar mass of the diblock copolymers was varied from 8 200 to 448 700 with all copolymers having low polydispersity indices. The block ratio was approximately 50/50 w/w of butadiene/isoprene. According to the chemical structure characterized by Fourier transform Raman spectroscopy (FT-Raman) and Gel Permeation Chromatograghy (GPC), the first block contained a mixture of cis-1,4 and trans-1,4-polybutadiene whereas the second block was primarily cis-1,4-polyisoprene. The diblock copolymers were also studied by Differential Scanning Calorimetry (DSC) and Dynamic Mechanical Analysis (DMA). It was found that the single glass transition temperature (T_g) appeared for poly(1,4-butadiene-b-cis-1,4-isoprene) having molar masses ranging from 8 200 to 307 900 whereas at high molar mass 448 700 two glass transition temperatures were observed. Three diblock copolymers were then used as compatibilizers in blends of polybutadiene and polyisoprene at a composition of 50/50 by weight (50/50 PB/PI blend). The amount of the diblock copolymers was varied at 5, 10, 15, 20, 25 and 30 part per hundred of rubber (phr) using solution blending. The resulting blends were seen to enhance the compatibility as seen by shifts of respective T_gs toward each other. The mechanical blending at composition of 50/50/5 of PB/PI/block copolymer was also attempted. It was also found that mechanical blending helped to enhance the compatibility further than that obtained from solution blending.