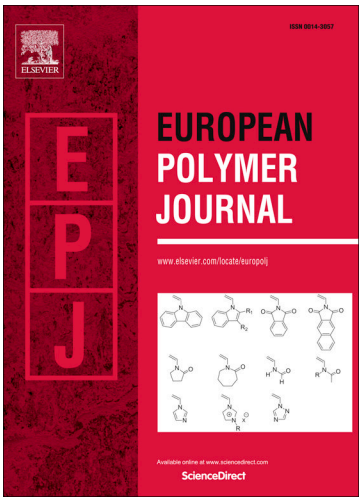

Impact of molecular structure of SBS on thermomechanical properties of polymer modified bitumen

Andreas Schaur, Seraphin Unterberger, Roman Lackner

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Impact of molecular structure of SBS on thermomechanical properties of polymer modified bitumen

Andreas Schaur, Seraphin Unterberger, Roman Lackner

Unit for Material Technology, University of Innsbruck, Technikerstrasse 13, 6020 Innsbruck, Austria

Abstract:

This article presents an investigation of 6 different triblock SBS (styrene-butadien-styrene) polymers with different structure (radial and linear) and different butadien:styrene ratio, used for modifying bitumen (70/100) with 5 and 16% polymer content. The behaviour of the polymer and the polymer modified bitumen (PmB) is characterized by dynamical shear rheometer (DSR), differential scanning calorimetry (DSC) and fluorescence microscopy (FM). The conditions for the formation of a polymer network controlled PmB and its effect on the mechanical performance of PmB were investigated. Based on the obtained results the number of styrene end blocks was identified as the key parameter for the formation of a polymer network. The polystyrene content controlled the coalescence and hence the distribution of polymer within the PmB. An increased polybutadiene content, on the other hand, lead to a more pronounced swelling of polymer within PmB by the adsorption of the maltene phase from bitumen, resulting in an increase of the polybutadiene particle size.

Keywords: Polymer modified Bitumen, SBS, structure, Rheology, DSC, Fluorescence microscopy

1 Introduction

Synthetic polymers are standardly used for modifying the performance of bitumen, with the properties of the so-obtained polymer modified bitumen (PmB) strongly depending on the employed polymer [1–3]. Among different polymers, styrene-butadien-styrene (SBS) block copolymers are the most frequently used elastomers for modifying bitumen, being produced by a sequential polymerization of styrene and butadiene blocks [4]. In addition to the structure