Saccharide Containing Block Copolymer as Green Dispersing Agent

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Polysaccharides and oligosaccharides are widely abundant in nature, and they are renewable and biodegradable. When combined with hydrophobic macromolecules, the resulting block copolymers are expected to exhibit interesting microdomain morphologies both in the bulk and in the solution state. In this study, we synthesized maltose-b-polybutadiene (maltose-b-PB) diblock copolymers via click reaction between alkyne-functionalized maltose and azide-functionalized PB. The molecular structure of the synthesized diblock was confirmed by proton nuclear magnetic resonance (1H NMR), Fourier-transform infrared spectroscopy (FTIR), and gel permeation chromatography (GPC). The diblock copolymers were then covalently attached to silica particle surfaces and utilized as a dispersing agent to improve distribution of hydrophilic silica particles in hydrophobic rubber matrix. Characterization of the composite material by scanning electron microscope (SEM) showed that these maltose-b-PB diblocks can indeed serve as a greener alternative to traditional dispersing agents.