

Enhancement of Thermomechanical Properties of Sulfur Copolymers by Thermal Treatments

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Inverse vulcanization has made it possible to synthesize polymeric sulfur inexpensively and easily, allowing the use of sulfur copolymers for various fields, including energy harvesting, energy storage, and infrared optics applications. However, their thermomechanical properties including glass transition temperature and dimensional stability are yet insufficient to use polymer sulfur in practical applications. We improved the thermomechanical properties of sulfur (S)-divinylbenzene (DVB) copolymers by conducting thermal treatments. Throughout systematic study on the thermomechanical properties according to the time-resolved thermal treatments at different temperatures, the structure-property correlation of the sulfur copolymers is developed. After thermal treatment at 140 °C for 12 h, the dynamic mechanical analysis revealed that the  $T_g$  of S-DVB increased from 86 °C to 103 °C and the mechanical properties enhanced from 1.8 GPa to 2.4 GPa.