

## **Effect of styrene content on structure and properties of vulcanizates from natural rubber grafted with polystyrene**

### **Abstract**

Graft copolymer from natural rubber grafted with polystyrene (NR-g-PS) was prepared. Influences of polystyrene (PS) content grafted on the natural rubber (NR) were investigated. Prior to compounding and compression molding to vulcanizates, the graft copolymers were prepared by emulsion polymerization. Proton nuclear magnetic resonance confirmed the chemical structure of the graft copolymer as NR-g-PS. Grafting of PS onto NR improved the tensile modulus and tensile strength of the vulcanizate, whereas the elongation at break decreased, depending on the PS content. However, a drastic reduction of tensile strength and elongation at break were seen when the PS content was greater than 20%. Compared to ungrafted NR, the onset strain for deformation-induced crystallization of graft copolymers was reduced, while the crystallinity at a given strain was higher. The improved tensile properties and crystallization ability suggest interfacial interactions of NR and PS phases. Such interactions were also responsible for improved thermal stability of the graft copolymer, having the degradation temperature increased by 17–38°C over the ungrafted NR. The best balance in overall properties was achieved by NR/PS 90/10.

### **Keywords**

graft copolymer; mechanical properties; Natural rubber; strain-induced crystallization; styrene content