Bio-Thermoplastic Elastomers with Shape Memory Behavior Prepared by Dynamic Vulcanization

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This work aims to use dynamic vulcanization of natural rubber (NR) and a bioplastic to prepare bio-based thermoplastic elastomers (TPE) showing shape memory behavior. A bioplastic polylactide PLA was melt-mixed with a compatibilizer Poly(ethylene-co-glycidyl methacrylate) (EGMA) and blended with natural rubber, curing agents and others in an internal mixer. The compatibilized blend of PLA/NR 60/40 wt% and EGMA 10 wt% was vulcanized (i.e. compatibilized TPV) using different sulfur content 1-2.5 phr.The results obtained from SEM revealed the NR phase in the compatibilized TPV is continuous net like structure while some part of PLA phase was finely dispersed in the NR domains. The torque from cure curve showed increasing values as sulfur content increased. The dynamic mechanical testing showed two glass transitions which were not much changed with sulfur content. The drop in modulus at the 2nd glass transition was about two orders for the compatibilized TPV while the compatibilized TPE showed about three-order drop in the storage modulus. The shape recovery from bending to 120 degrees at 69 °C 90 s was 96% for the compatibilized blend and 98%, 94% and 91% for specimens of compatibilized TPV with sulfur 1, 1.5-2, 2.5 phr, respectively.

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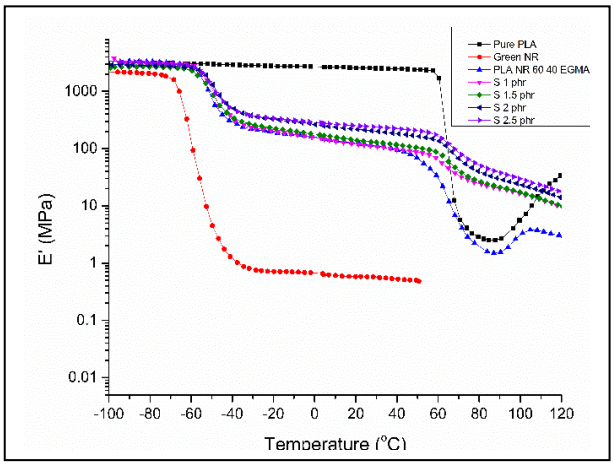

Storage modulus of PLA and NR in comparison to those of PLA/NR 60/40 wt% with EGMA 10 wt% and its dynamic vulcanizates using sulfur content of 1.0-2.5 phr

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She graduated from Chulalongkorn University in 1988 with BS in Chemical Technology (Chemical Engineering) and from University of Akron, USA with MS in Polymer Engineering in 1993, MS in Engineering Management and PhD in Polymer Science in 1996. She was a visiting scientist at Kyoto University, Japan in 2001.
Research Interest: Advanced NR technology, Polymer clay nanocomposites, Bioplastics