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## Hard segment multi-functionalized polyolefin-based high-temperature thermoplastic elastomer via anionic living and block graft polymerization followed by thiolene click reaction

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Conventional polyolefin-based thermoplastic elastomers have a variety of merit. But the copolymers including block, graft and blend types have some limitations due to their low use temperature. In this study, novel polyolefin-g-poly(t-butylstyrene) as one of the promising high utility temperature polyolefin-based thermoplastic elastomers was synthesized by the graft anionic living polymerization from the initiation of styrene unit form the poly(t-butylstyrene) hard grafts along the poly(ethylene-ter-1-hexane-ter-divinylbenzene) backbone as the soft block (0.3~0.5 mol% of graft sites). Phase-separation occurred in these polyolefin TPEs when the Mn of poly(t-butylstyrene) was more than 5,000 g/mol, which was evidenced by the presence of two distinct Tgs(-20°C of polyolefin soft block and 125°C of poly(t-butylstyrene) hard block) observed in DSC and DMTA. These high temperature polyolefin TEPs exhibited distinct mechanical property with high modulus and toughness even above 125°C. And when the content of P(t-butylstyrene) over 28wt%, excellent mechanical properties: high tensile strength (>21MPa) with high elongation (>1,100%) could be obtained, similar to that of S-EB-S(30wt% styrene content). The multi-carboxyl functionalized polyolefin-g-poly (t-butylstyrene) could be synthesized by the incorporation of high vinyl oligo-isoprene at the end of poly (t-butylstyrene) hard block via sequential anionic polymerization followed by the thiolene click reaction with thioglycolic acid to incorporate multi-carboxyl groups at the pendant vinyl units. The contact angle of these result multi-carboxyl functionalized polyolefin (12-COOH/molecule) was decreased to 58° compared to 95° in case of the non-functionalized polyolefin TPEs.

### Biography

Bum Jae Lee has completed his PhD from The University of Akron in Polymer Science and is currently Professor of Department of Applied Chemical Engineering since 1995. He has published more than 25 papers in reputed journals and has been applied for 15 patents.

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