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Twin-screw Extrusion of Short Glass Fiber Reinforced ABS/PA6 Blends: Mechanical and Morphological Properties

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In this study, acrylonitrile-butadiene-styrene (ABS) terpolymer was reinforced with short glass fibers (SGFs). The effects of extrusion process conditions such as screw speed and barrel temperature profile on the mechanical properties of the composites were examined. The increase in screw speed decreased the average fiber length, therefore, tensile strength, tensile modulus, flexural modulus and impact strength were affected negatively and strain at break was affected positively. The increase of extrusion temperature decreased the fiber length degradation; therefore, tensile strength, tensile modulus, flexural modulus and impact strength increased. Because of degradation of ABS at higher temperatures, the mechanical strength of composites decreased. To obtain a strong interaction at the interface, polyamide-6 (PA6) at varying concentrations was introduced to the ABS/30wt%SGF composite. The incorporation and increasing amount of PA6 in the composites broadened the fiber length distribution owing to the low melt viscosity of PA6. Due to the improved adhesion at the interface, tensile strength, tensile modulus, flexural modulus and impact strength values increased with an increase in the PA6 content of ABS/PA6/SGF systems. These results were also supported by the SEM micrographs of ABS/PA6/SGF composites which exhibited an improved adhesion between SGFs and ABS/PA6 matrix.