The Effect of Chemical Modification and Interlaminar Weld-Line on Physical Properties of PP/Continuous Glass Fiber Composite Systems

Youngkwan Lee†, Junmyung Kim, Kangbae Yoon, Jaedo Nam,* and Dongwook Kim*
Department of Chemical Engineering, *Polymer Engineering
Sungkyunkwan University, Suwon 440-746, Korea
†E-mail: yklee@yurim.skku.ac.kr
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ABSTRACT: In this study, the effect of the concentration of anhydride modified polypropylene (MPP) and the interlaminar weld-line on mechanical properties of film stacking processed polypropylene/glass fabric composite systems were investigated. A thermally-expandable rubber tool was used to impregnate the matrix by maintaining a relatively uniform pressure. A pseudo-steady state approximation was used to calculate the resin-impregnation time and pressure for the rubber tool process. Comparing the impregnation processes from a single film at the center and from two films at the top and bottom sides, the two-film process produced an interlaminar weld-line at the laminate center, and took one-fourth shorter impregnation time. From three-point bending tests and SEM experiments, the MPP clearly increased the adhesive strength between fiber and matrix. The impact strength of PP matrix only composite was higher than that of MPP laminates, and the interlaminar weld-line at the laminate center seemed to increase the impact strength. The optimum content of MPP was observed to be ~50% in tensile tests.

Keywords: polypropylene, modified polypropylene, glass mat, film stacking, weld-line.