

The Sizing Material for Polyamide-6 CFRTP Produced by Reactive Processing

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ABSTRACT TEXT

The carbon fiber-reinforced thermoplastic (CFRTP) is a promising candidate for aerospace and automotive industries. This is because the CFRTP has high-strength with desired light-weight and also can be welded or recycled upon melting unlike thermoset CFRTP. However, application of the CFRTP was still limited due to poor interfacial adhesion between fibers, especially carbon fibers, and thermoplastic resins and long cycle time coming from high viscosity of thermoplastic resin. In this work, in order to improve mechanical strength of the CFRTP, the sizing material for PA-6 was designed and synthesized. The sizing material can act as an initiator of polymerization during reactive processing, which form strong interfacial adhesion. Also the PA-6 CFRTP were produced by reactive processing with *in-situ* polymerization of caprolactam, of which has low viscosity. So that the CFRTP having good impregnation and strong adhesion between fibers and thermoplastic resin can be produced with short cycle time. The produced CFRTP were investigated in terms of PA-6 matrix, impregnation, interfacial adhesion, and mechanical strength, especially inter-laminar shear strength (ILSS). As a result, in despite of tiny amount of the sizing material usage, the sizing material is surprisingly effective to increase ILSS more than 30% comparing with the neat CFRTP.

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