The Fourth International Conference on Woodfiber-Plastic Composites

Microstructure and Dynamic Fracture Toughness of Polypropylene Reinforced with Cellulose Fiber

Craig M. Clemons
A. Jeffrey Giacomin
Daniel F. Caulfield

Abstract

The microstructure of injection-molded cellulose-fiber-reinforced polypropylene was investigated. Scanning electron microscopy of the fracture surfaces and X-ray diffraction were used to investigate fiber orientation. The polypropylene matrix was removed by solvent extraction and the lengths of the residual fibers were optically determined by a Kajaani FS-100 fiber analyzer. Fiber lengths were reduced by one-half when compounded in a high-intensity thermokinetic mixer and then injection-molded. At low fiber contents, there is little fiber orientation; at high fiber contents, a layered structure arises. To better understand the mechanisms of fracture under impact loading, dynamic fracture analysis was performed based on linear elastic fracture mechanics. Dynamic critical energ release rates and dynamic critical stress intensity factors were reduced h-em instrumented Charpy impact test measurements. Dynamic fracture toughness increased with cellulose content and with increasing orientation of fibers perpendicular to the crack direction.

Clemons:
Chemical Engineer, USDA Forest Serv., Forest Prod. Lab., Madison, Wisconsin
Giacomin:
Professor, Dept. of Mechanical Engineering, Univ. of Wisconsin, Madison, Wisconsin
Caulfield:
Research Chemist, USDA Forest Serv., Forest Prod. Lab., Madison, Wisconsin

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Forest Products Society
2801 Marshall Court
Madison, WI 53705-2295
phone: 608-231-1361
fax: 608-231-2152
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