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F. Berzin, J. Beaugrand, S. Dobosz, T. Budtova, B. Vergnes

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**Lignocellulosic fiber breakage in a molten polymer. Part 3. Modeling of the dimensional change of the fibers during compounding by twin screw extrusion**

F. Berzin<sup>a\*</sup>, J. Beaugrand<sup>a</sup>, S. Dobosz<sup>a</sup>, T. Budtova<sup>b</sup>, B. Vergnes<sup>b</sup>

<sup>a</sup>UMR FARE (Fractionnement des AgroRessources et Environnement), Université de Reims Champagne-Ardenne, INRA, 2 esplanade Roland-Garros, 51686 Reims, France

<sup>b</sup>MINES ParisTech, PSL Research University, CEMEF (Centre de Mise en Forme des Matériaux), UMR CNRS 7635, CS 10207, 06904 Sophia Antipolis Cedex, France

\* Corresponding author: F. Berzin

[francoise.berzin@univ-reims.fr](mailto:francoise.berzin@univ-reims.fr), Tel.: (33) 3 26 91 84 77

**Abstract**

In Part 1 and Part 2 of this series, models describing lignocellulose fiber breakage during melt mixing process have been established. In Part 3, these models are applied to predict fiber size when compounding composites in a twin-screw extruder. A comparison with the experimental values of fiber dimensions in composites made under different processing conditions is performed. Various types of fibers (flax, hemp and sisal) with different initial morphologies and sizes were considered in order to show the generality of the approach. First, experimental results, highlighting the main impact of processing parameters on the fiber dimensions, are presented. A particular interest was paid on the change of fiber length, diameter and aspect ratio (length/diameter) all along the screws. Then, it is shown how flow modeling can help to better interpret these results and lead to a predictive approach of fiber breakage during twin-screw extrusion, in order to optimize the compounding process.

**Keywords:** A. Natural fibers, A. Polymer-matrix composites, C. Process modeling, E. Extrusion

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