

MATERIAL EXTRUSION ADDITIVE MANUFACTURING OF THERMOSET-BASED SHORT FIBER COMPOSITES

Brett Compton; Mechanical, Aerospace, and Biomedical Engineering Department; University of Tennessee, Knoxville, USA
 brettcompton@utk.edu

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This talk will discuss the challenges and opportunities associated with material extrusion additive manufacturing (AM) of short fiber composites, with an emphasis on thermoset-based systems. The talk will begin with a brief review the origin and early work in AM of thermosets and short fiber composites then proceed into current research that investigates the factors that control the fiber length distribution (FLD) in printed short-fiber composites and how FLD influences printability and mechanical properties. The talk will conclude with an introduction of novel printing approaches that enable higher fiber loading, unique material architecture, and greater control over fiber orientation.

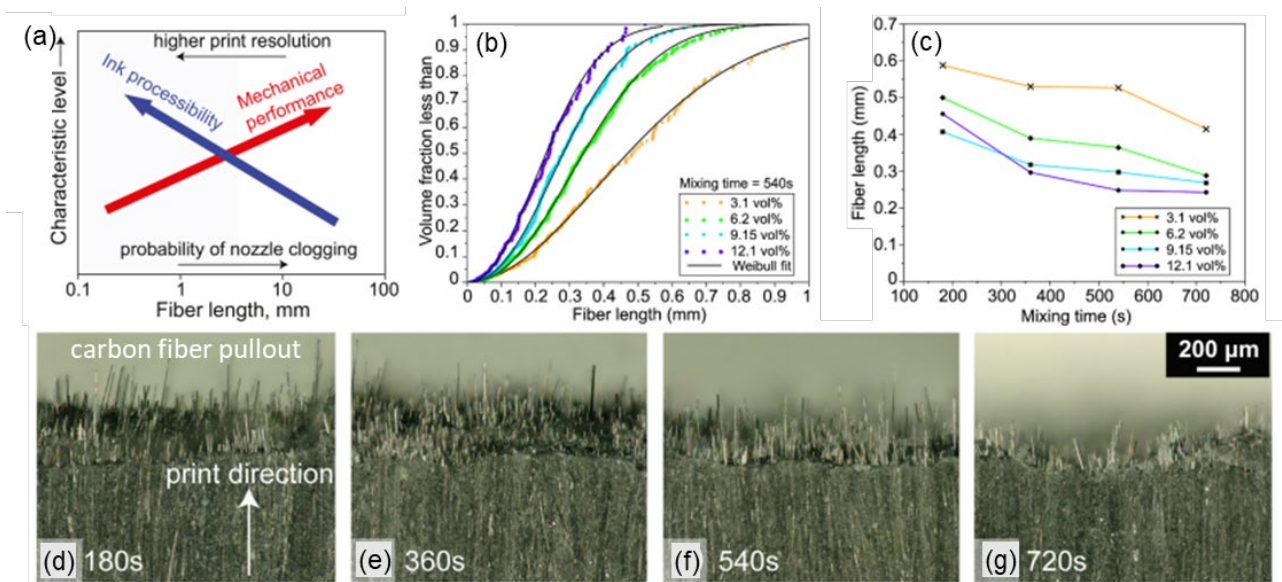


Figure 1: (a) Schematic illustrating tradeoff between printing behavior and mechanical performance in 3D-printed short fiber composites. (b) Example cumulative distribution function for fiber length in epoxy / short carbon fiber composites. (c) Volume-weighted average fiber length in 3D printed epoxy / short carbon fiber composites subject to different fiber loading and mixing times. (d-g) Optical micrographs of the same composites subject to different mixing times showing fiber pullout after flexural testing.