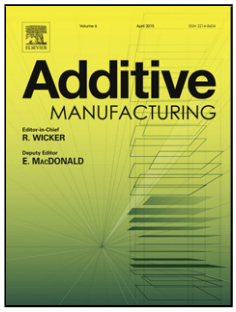

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Investigation of Process-Structure-Property Relationships in Polymer Extrusion Based Additive Manufacturing Through In Situ High Speed Imaging and Thermal Conductivity Measurements

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Highlights:

- Carries out *in situ* high speed imaging of polymer extrusion additive manufacturing.
- Measures thermal conductivity of built part as a function of process parameters.
- Develops correlation between process, microstructure and thermal properties.
- Results show strong dependence of thermal property on raster speed & layer height.
- Results may be helpful for process optimization to obtain novel, functional parts.

Abstract

Additive manufacturing has gained significant research attention due to multiple advantages over traditional manufacturing technologies. A fundamental understanding of the relationships between process parameters, microstructure and functional properties of built parts is critical for optimizing the additive manufacturing process and building parts with desired properties. This is also critical for a multi-functional part where the process needs to be optimized with respect to disparate performance requirements such as mechanical strength and thermal conductivity. This paper presents *in situ* high speed imaging and thermal conductivity measurements of polymer extrusion based additively manufactured parts in order to understand the effect of process parameters such as raster speed, infill percentage and layer height on build-