Abstract Submitted
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Determining heat loss from the surface of polymer films via modeling of experimental fluorescence thermometry[1] GABRIEL FIRESTONE, JASON BOCHINSKI, Department of Physics, North Carolina State University, Raleigh, NC , JEFFREY METH, Dupont, LAURA CLARKE, Department of Physics, North Carolina State University, Raleigh, NC — Understanding of the heat transfer characteristics of a polymer during processing is critical to predicting and controlling the resulting properties and has been studied extensively in injection molding. As new methodologies for polymer processing are developed, such as photothermal heating, it is important to build an understanding of how heat transfer properties change under these novel conditions. By combining theoretical and experimental approaches, the thermal properties of photothermally heated polymer films were measured. The key idea is that by measuring the steady state temperature profile of a spot heated polymer film via a fluorescence probe (the temperature versus distance from the heated region) and fitting to a theoretical model, heat transfer coefficients can be extracted. We apply this approach to three different polymer systems, crosslinked epoxy, poly(methyl methacrylate) and poly(ethylene oxide) thin films with a range of thicknesses, under different heating laser intensities and with different resultant temperatures. We will discuss the resultant trends and extension of the model beyond a simple spot heating configuration.

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