Abstract Submitted
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Anisotropic Thermal Processing of Polymer Nanocomposites via the Photothermal Effect of Gold Nanorods[1] J.R. BOCHINSKI, S. MAITY, L.I. CLARKE, Dept. of Physics, NC State University, Raleigh, NC 27695, K.A. KOZEK, W. WU, J.B. TRACY, Materials Science and Engineering, NC State University, Raleigh, NC 27695 — Embedding metal nanoparticles within polymeric materials enables spatially-selective, in-situ thermal polymer processing [1,2]. When irradiating such a nanocomposite with light resonant with the particle's surface plasmon resonance, the photothermal effect efficiently transforms the energy into localized heat. Utilizing anisotropically-shaped particles enables further heating control based on the polarization sensitivity of the light-particle interaction. Photothermal heating from oriented gold nanorods selectively heats polymeric nanofibers by melting fibers lying only along a chosen direction while leaving the remaining material largely unaffected [3]. Fluorescence-based temperature-sensing measurements confirms heating in selected fibers and its absence in counter-aligned fibers. Such facile thermal processing of a specified subset of a sample, while the remainder is unchanged cannot be achieved through conventional heating. Results on spatially-selective heating and nanoscale temperature measurements within polymer systems doped with active nanoparticles will be discussed.

[1] S. Maity et al., *Polymer* **52**, 1674 (2011).
[2] S. Maity et al., *Adv. Funct. Mat.* (in press) (2012).
[3] S. Maity et al., *Part. & Part. Syst. Char.* (in press) (2012).

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