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Photothermal Heating via Gold Nanorods within Polymer Nanocomposites[1] JASON BOCHINSKI, SOMSUBHRA MAITY, WEI-CHEN WU, JOSEPH TRACY, LAURA CLARKE, North Carolina State University — Metal nanoparticles under continuous-wave (cw) optical excitation resonant with their localized surface plasmon exhibit a photothermal effect, efficiently converting the incident light into heat [1] originating from the particle. Gold nanorods (GNRs) dispersed within a transparent material are utilized as such remotely-controlled, nano-sized heaters [2], with heating properties which can be manipulated and monitored by using control of the polarization direction [3, 4] of the excitation and probe light fields. Steady-state average temperatures within a polymer matrix embedded with GNRs undergoing cw photothermal heating are determined in the immediate vicinity of the GNR by observing the rate of driven physical rotation of the nanorods, and simultaneously across the entire sample by using an independent fluorescence method. Comparing these two observations as the concentration of dispersed GNRs is varied reveals the interplay between local and global heating in these polymer nanocomposite materials.

[1] S. Maity et al., *Polymer* **52**, 1674 (2011).
[2] S. Maity et al., *Adv. Funct. Mater.* **22**, 5259 (2012).
[3] S. Maity et al., *Part. & Part. Sys. Char.* **30**, 193 (2013).
[4] S. Maity et al., *Nanoscale* **in press**, (2014)

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