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Abstract for an Invited Paper
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Photothermal heating at the nano and meso scales within polymer nanocomposites[1]

LAURA CLARKE[2], North Carolina State University

Metal nanoparticles strongly absorb specific wavelengths of visible/infrared light with no radiative relaxation by which to release this energy. As a result, the absorbed energy is efficiently converted to local heat (a photothermal effect [1]). With an effective cross-section of up to 10 times its physical size, each particle acts as a "super-sized" absorber even when embedded within a material environment, resulting in dramatic heating [2,3] originating at the particles. Polymer nanocomposites containing metal nanoparticles can then be probed [4] and altered by applying internal heat at nano- and meso- length scales. I'll discuss our recent studies [5] utilizing this effect, including internal annealing to increase crystallinity fraction in both films and nanofibers of poly(ethylene oxide) [6], in-situ curing of epoxy, and intentional degradation of starch-poly(ethyl cyanoacrylate) composites. The talk will highlight the unique features of a photothermal approach, such as the ability to couple energy quickly (as light) into low thermal conductivity environments and possible changes in thermal conductivity at the particle-polymer interface. [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* **6**, 15236 (2014). [5] D. B. Abbott et al., *Macrom. Chem. Phys.* **215**, 2345 (2014). [6] V. Viswanath et al.,*Macromolecules* **46**, 8596 (2013).

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[2]Department of Physics