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Use of embedded metal nanoparticles as photothermal heaters in polymer nanocomposites SOMSUBHRA MAITY, JASON BOCHINSKI, LAURA CLARKE, NC State University — Embedded metallic nanoparticles within polymer nanofibers can internally heat and thus thermally-modify (soften, melt, or bond) polymer composites when irradiated with visible light via excitation and non-radiative relaxation of the nanoparticle surface plasmon resonance. Because the heating originates at the nanoparticle surface and propagates outward, a strong spatial temperature gradient exists. We discuss a non-contact, temperature-sensitive fluorescence technique to determine local temperature within the composite, which utilizes changes in the emission spectrum of perylene.....,[1] in addition to determining temperature from changes in polymer morphology. The efficacy of plasmonic heating in different morphologies (nanofibers/films) as well as its effect on material mechanical properties when heated between T_g and T_m is discussed. The spatial specificity of the photothermal heating as determined by the nanoparticle location represents a unique nanoprocessing tool.

[1]Bur, A. J.; Vangel, M. G.; Roth, S. *Applied Spectroscopy* **2002,** 56, (2), 174-181.

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