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**Probing polymer heat transport and dynamics via photothermal heating from metal nanoparticles** LAURA CLARKE, GABRIEL FIRESTONE, JASON BOCHINSKI, Department of Physics, NC State University — Metal nanoparticles strongly absorb specific wavelengths of visible/infrared light which is efficiently converted to local heat (a photothermal effect). Polymer films doped with a small concentration of metal nanoparticles can then be probed by applying internal heat at nano- and meso- length scales. When a constant light intensity is applied, and internal temperature is monitored, the transient response of the system as it approaches steady state reveals information about the heat losses present, and how heat transport changes with temperature. The steady state temperature versus position within photothermally-heated samples is not homogeneous. By measuring temperature via embedded fluorescent molecules, independent monitoring (due to polarization sensitivity) of molten and solid regions can be accomplished. Altering the nanoparticle concentration and light intensity can reveal information about both the temperature profile due to photothermal heating and the polymer's innate response to heat application at different length scales.

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