

Abstract Submitted  
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**Using Gold Nanorods to Probe the Local Environment within Polymer Nanocomposites**<sup>1</sup> LAURA CLARKE, SOMSUBHRA MAITY, WEI-CHEN WU, JOSEPH TRACY, JASON BOCHINSKI, North Carolina State University — Active metal nanoparticles embedded within polymeric materials can generate internal photothermal heating [1,2] to enable processing, such as shape memory actuation [3] or thermal annealing [4], with outcomes unrealizable by conventional means. When gold nanorods are utilized [5, 6], their anisotropic-shape provides additional capabilities: using the nanoparticle as an optical probe allows quantitative measurement of the local polymer environment, particularly in the melt phase. Specifically, one surface plasmon excitation can heat while the other monitors particle orientation (altered by rotational diffusion) to make a temperature measurement in the region near the nanorod [6]. We describe results from this approach along with examples of the differing local environments within the polymer due to changes in processing.

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- [2] S. Maity et al., *Adv. Funct. Mater.* **22**, 5259 (2012).
- [3] D. B. Abbott et al., *Macromolecular Chemistry and Physics* **in press**, (2014).
- [4] V. Viswanath et al., *Macromolecules* **46**, 8596 (2013).
- [5] S. Maity et al., *Part. & Part. Sys. Char.* **30**, 193 (2013).
- [6] S. Maity et al., *Nanoscale* **in press**, (2014).

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