

Supporting Information

Entanglement-Based Thermoplastic Shape Memory Polymeric Particles with Photothermal Actuation for Biomedical Applications

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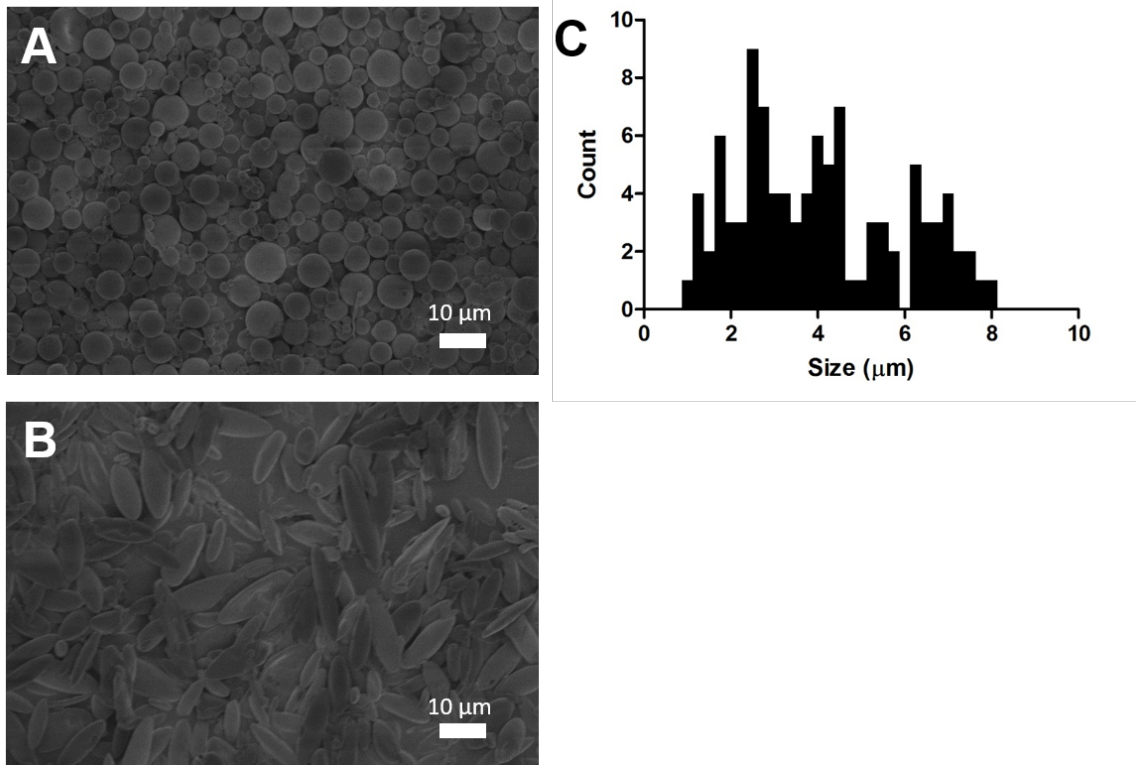
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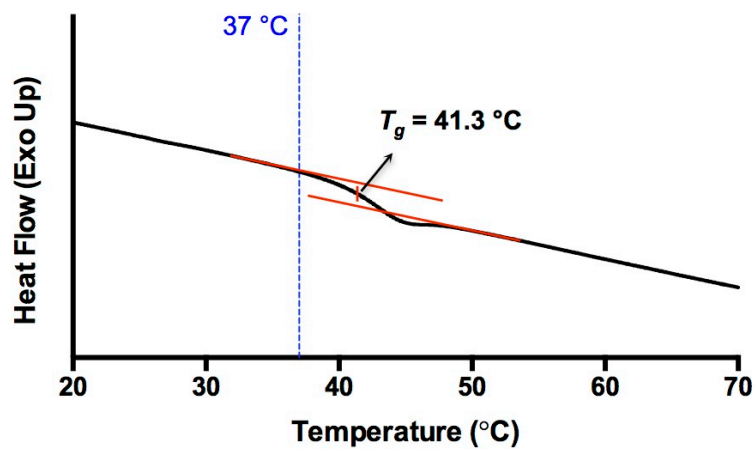
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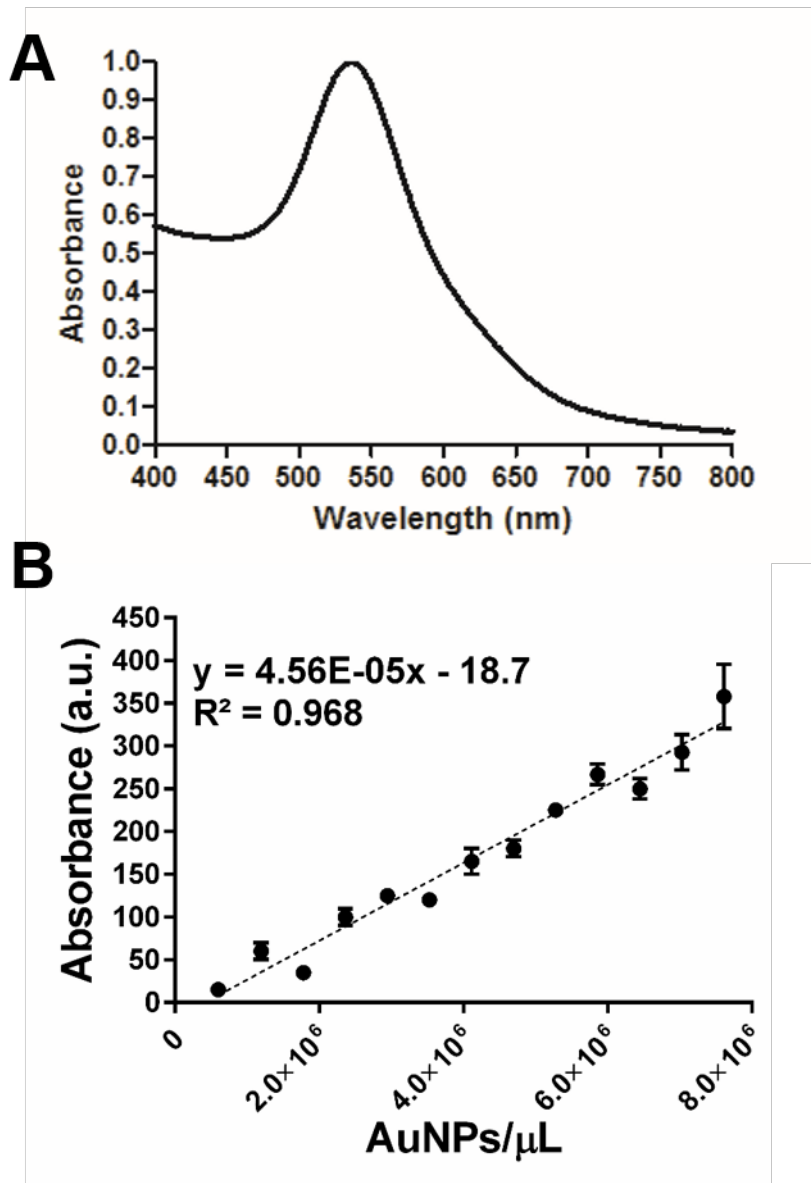
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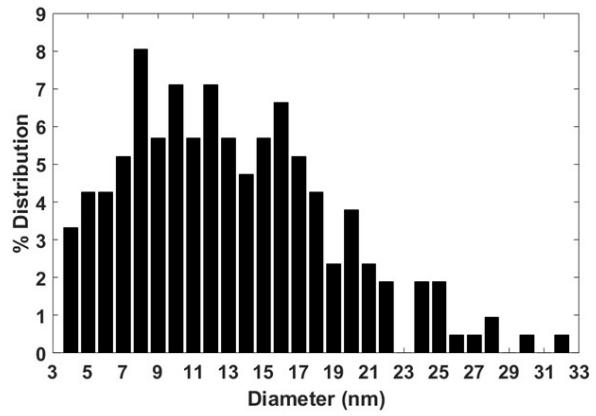
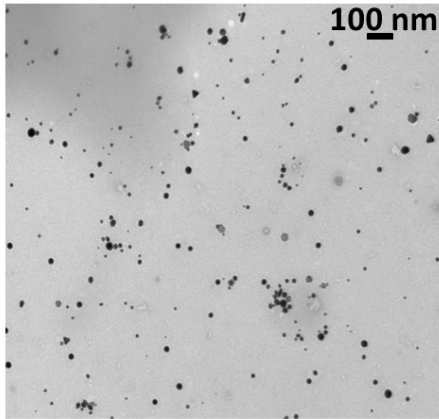
Supplementary Figure S1. SEM characterization of (A) Spherical and (B) Non-spherical particles. (C) Size characterization of the spherical particles demonstrates a mean size of approximately 5 μm .



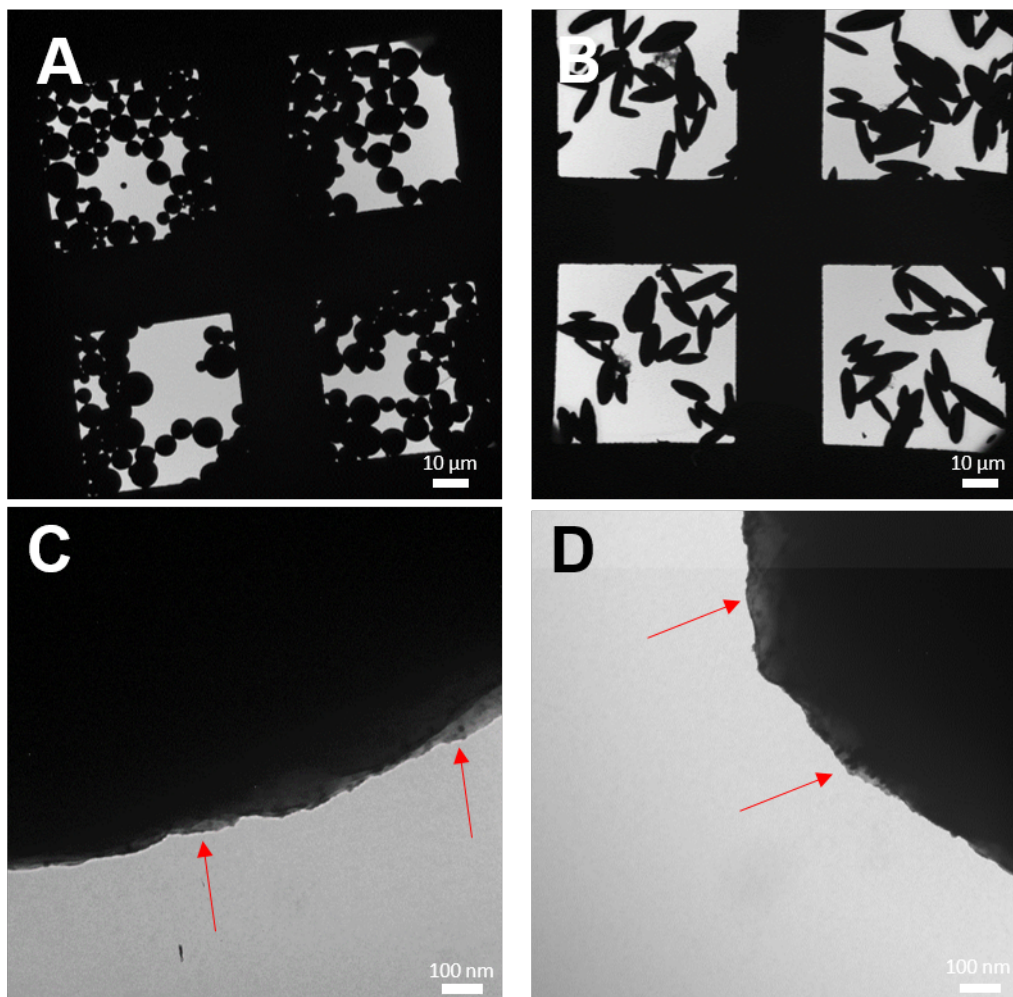
Supplementary Figure S2. DSC second heating curve of PDLLA particles incubated in water.



Supplementary Figure S3. (A) Absorbance spectrum and (B) Standard curve of AuNPs (various concentrations in 1 mL of toluene) in the presence of pure PDLLA microparticles (5 mg in 400 μL of DMSO). The gold nanoparticles were present at 1.63×10^{10} particles/mg of PDLLA microparticles (including the mass of AuNPs loaded) and the absorbance peak was 530 nm.



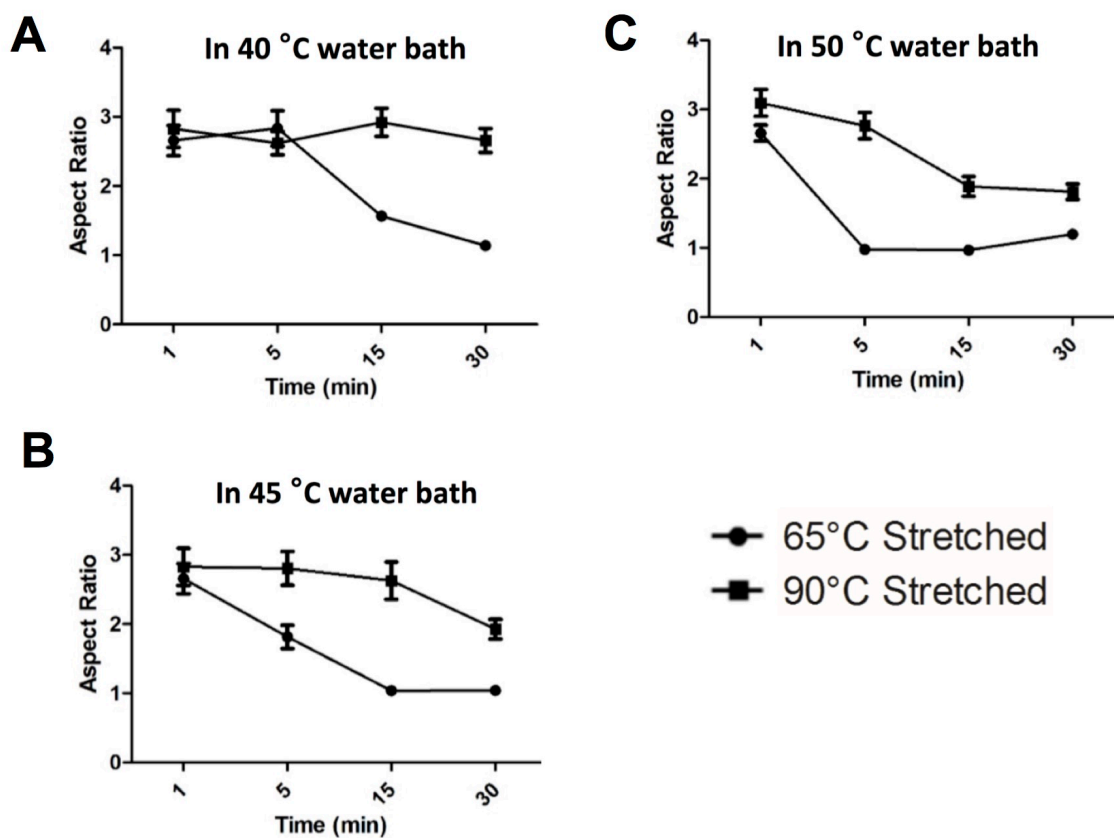
Supplementary Figure S4. TEM characterization of DOPC AuNPs (left) and histogram (right) of diameters observed (14 ± 6 nm).



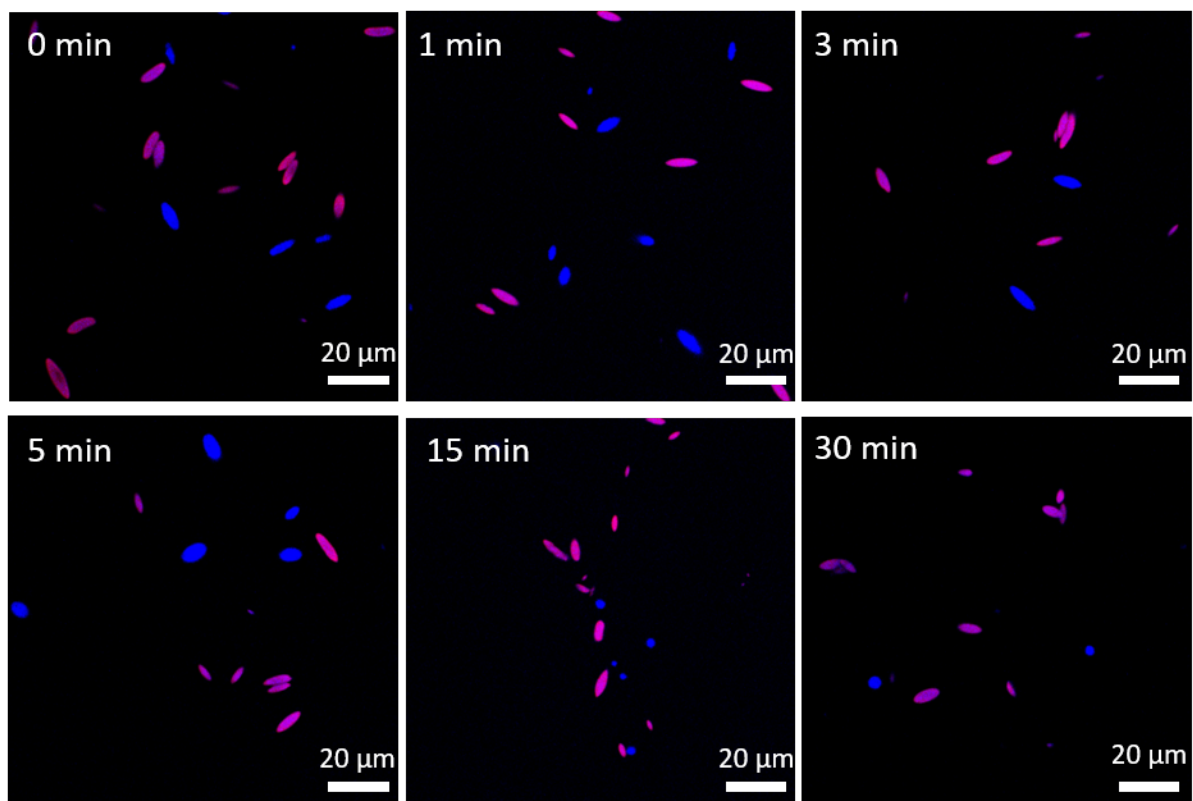
Supplementary Figure S5. (A) Spherical and (B) Non-spherical PDLLA microparticles encapsulating gold nanoparticles were imaged under TEM to analyze the presence of gold nanoparticles. Zoomed in pictures of the edges (area of minimal polymer TEM image interference) of (C) Spherical and (D) Stretched microparticles demonstrate the presence of gold nanoparticles (red arrows) encapsulated within the polymeric microparticles.



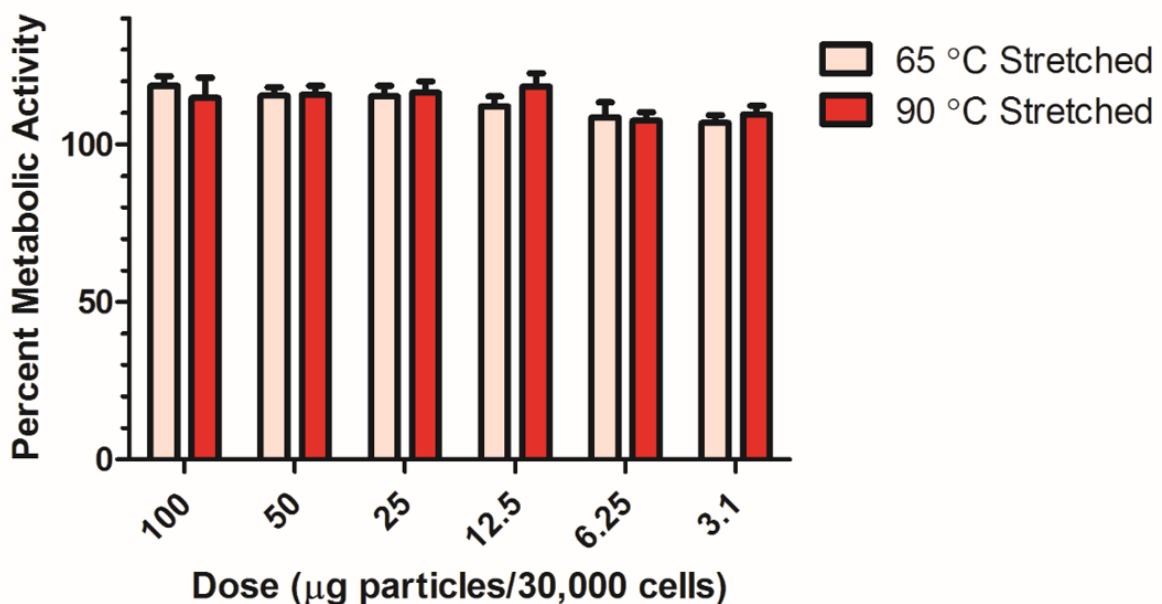
Supplementary Figure S6. PDLA microparticles without encapsulated AuNPs used for the background in the calibration curve (Figure S3).



Supplementary Figure S7. Aspect ratio analysis from SEM of particles stretched at 65 °C or 90 °C heated at (A) 40 °C, (B) 45 °C or (C) 50 °C for the indicated time points demonstrates preferential reversion back to spherical form by the particles stretched at a lower temperature. Error bars are the standard error of 20 particle replicates.



Supplementary Figure S8. Time course images taken of mixed particles heated at 45 °C for the indicated times. Blue particles were stretched at 65 °C and magenta particles were stretched at 90 °C. Images show complete reversion to spherical form over the 30 min period of heating for the 65 °C stretched particles, and no reversion of shape for the 90 °C stretched particles.



Supplementary Figure S9. Cell viability is not altered by exposure of the cell to various doses. Cell metabolic rate was assessed after 4 hr. of exposure to the particles by MTS assay. The rates were then normalized to untreated cells to give percent metabolic activity. No significant reduction was noted. Error bars are standard error of $n = 4$ replicates.

Supplementary Movie S10. Shape recovery process of 65 °C stretched particles monitored by POM on a hot stage at 45 °C.