

Electronic Supplementary Information (ESI)

Transdermal Thiol-Acrylate Polyethylene Glycol Hydrogel Synthesis Using Near Infrared Light †

*Solchan Chung^a, Hwangjae Lee^a, Min-Gon Kim^b, Hyung-Seok Kim^c, Luke P. Lee^d, and Jae
Young Lee^{a,e*}*

^aSchool of Materials Science and Engineering, Gwangju Institute of Science and Engineering,
Gwangju 500-712, South Korea

^bDepartment of Chemistry, Gwangju Institute of Science and Engineering, Gwangju 500-712,
South Korea

^cDepartment of Forensic Medicine, Chonnam National University Medical School, Gwangju
501-747, South Korea

^dDepartment of Bioengineering, Berkeley Sensor and Actuator Center, University of California
Berkeley, Berkeley, CA 94720-1762, USA

^eDepartment of Biomedical System Engineering, Gwangju Institute of Science and Engineering,
Gwangju 500-712, South Korea

Contents:

Table S1. Compositions of precursor solutions

Figure S1. SEM image of thiol-acrylate hydrogel.

Figure S2. Quantitative analysis of free thiol groups in the polymer solution by Ellman's assay.

Figure S3. Temperature increase at injection site during transdermal photothermal hydrogelation.

Figure S4. In Vitro degradation of thiol-acrylate hydrogels.

Table S1. Compositions of precursor solutions with different concentrations and their [SH]/[acryl] ratios

[SH] / [acryl]	[PEGDA]	[PEG4SH]	[PEG4Ac]
0	8%	0%	10%
0.1	8%	2.7%	7.3%
0.25	8%	6%	4%
0.4	8%	8.6%	1.4%
0.5	8%	10%	0%

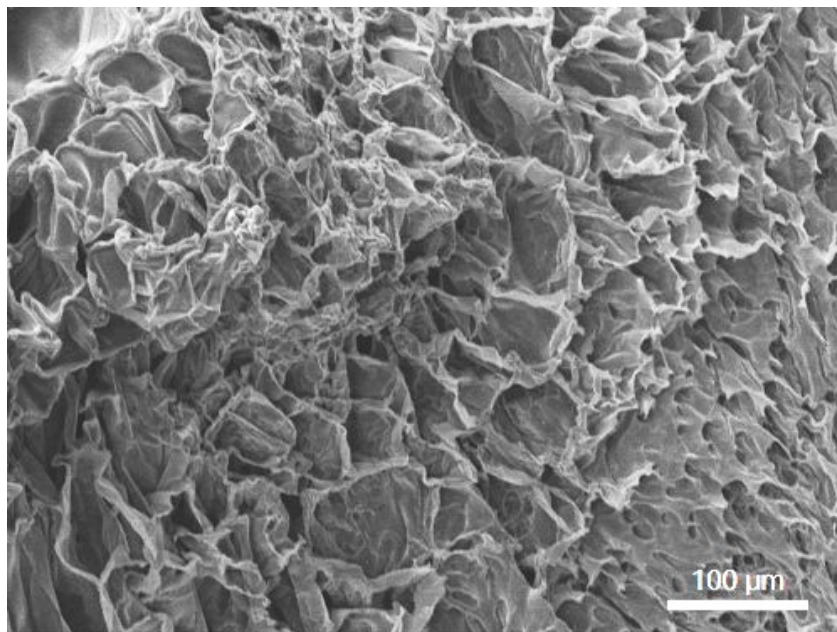


Figure S1. SEM image of freeze dried thiol-acrylate hydrogel. Hydrogel was prepared by irradiating 0.3 W/cm^2 of NIR light for 10 min upon the precursor solution consisting of 8% PEGDA, 10% PEG4SH, 1 nM GNR-PEG, and 1% AIPH.

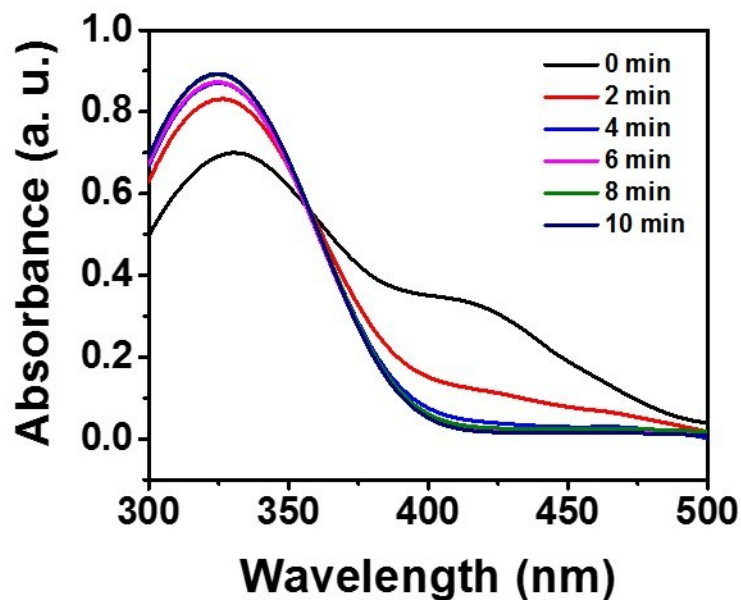


Figure S2. Quantitative analysis of free thiol groups in the polymer solution by Ellman's assay. Thiol-acrylate PEG solutions were irradiated with 0.3 W/cm^2 785 nm laser for different time periods. The samples were mixed with the Ellman's reagent that readily reacts with free thiol groups, and then measured using a UV/Vis spectrometer. Absorbance peak intensities at 412 nm indicates amount of free thiol groups in the solution.

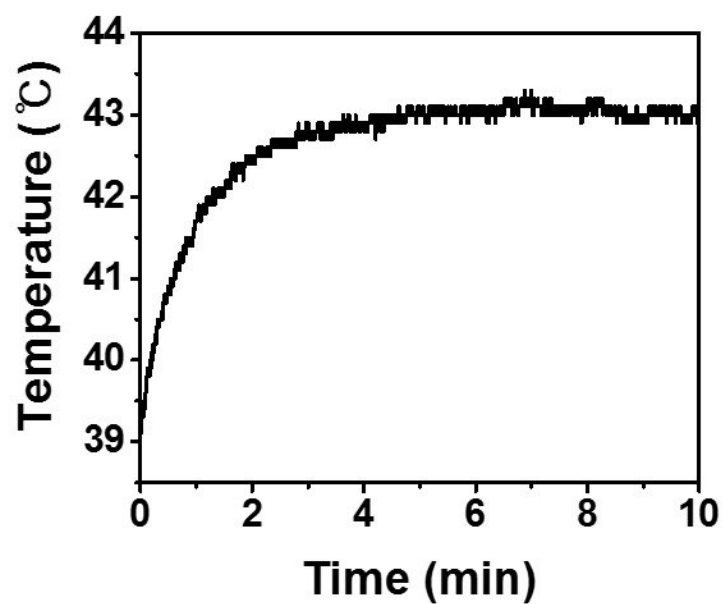


Figure S3. Temperature increase at injection site during transdermal photothermal hydrogelation. Injected precursor solution consists 8% PEGDA, 10% PEG4SH, 1 nM GNR-PEG, 1% AIPH, and 0.1 mM fluorescein o-acrylate. Upon the injection site, 0.4W/cm² of 785 nm NIR laser was irradiated for 10 min.

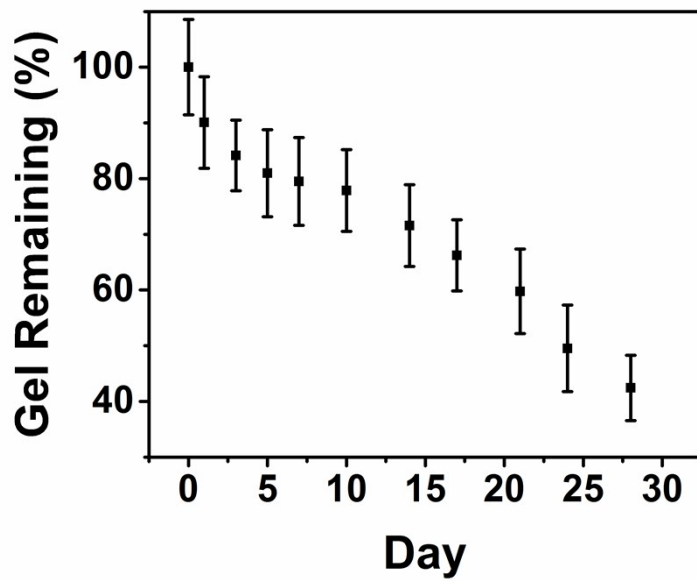


Figure S4. In Vitro degradation of thiol-acrylate hydrogels. Precursor solutions including 8% PEGDA, 10% PEG4SH, 1 nM GNR-PEG, and 1% AIPH in PBS (pH 7.4) were irradiated with 0.3 W/cm² of NIR light for 10 min to synthesize thiol-acrylate hydrogels. Hydrogels were put into petri dish filled with PBS (pH 7.4). Inside a 37°C incubating shaker, the petri dish was shook with 50 rpm for 4 weeks. After soaking up PBS on the surface of hydrogel, weight was measure from time to time. n=6.