Supporting information

$Ti_2C_3T_x$ Nanosheets as Photothermal Agents for Near-Infrared Responsive Hydrogels

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1. Determination of lateral size and height distributions

It can be seen that the lateral size and height distribution based on 28 nanosheets in the histogram. The majority of the MXene nanosheets have a lateral size of 0.5–1 μm and a thickness of 2–4 nm. The deviation of the apparent AFM height of nanosheets should be attributed to the intrinsic ripples of two-dimensional nanosheets,[1, 2] as well as the unavoidable presence of trapped solvent under the sheet surfaces.[3, 4] In addition, we can also observe many stacked nanosheets in the TEM images (Figure S2).

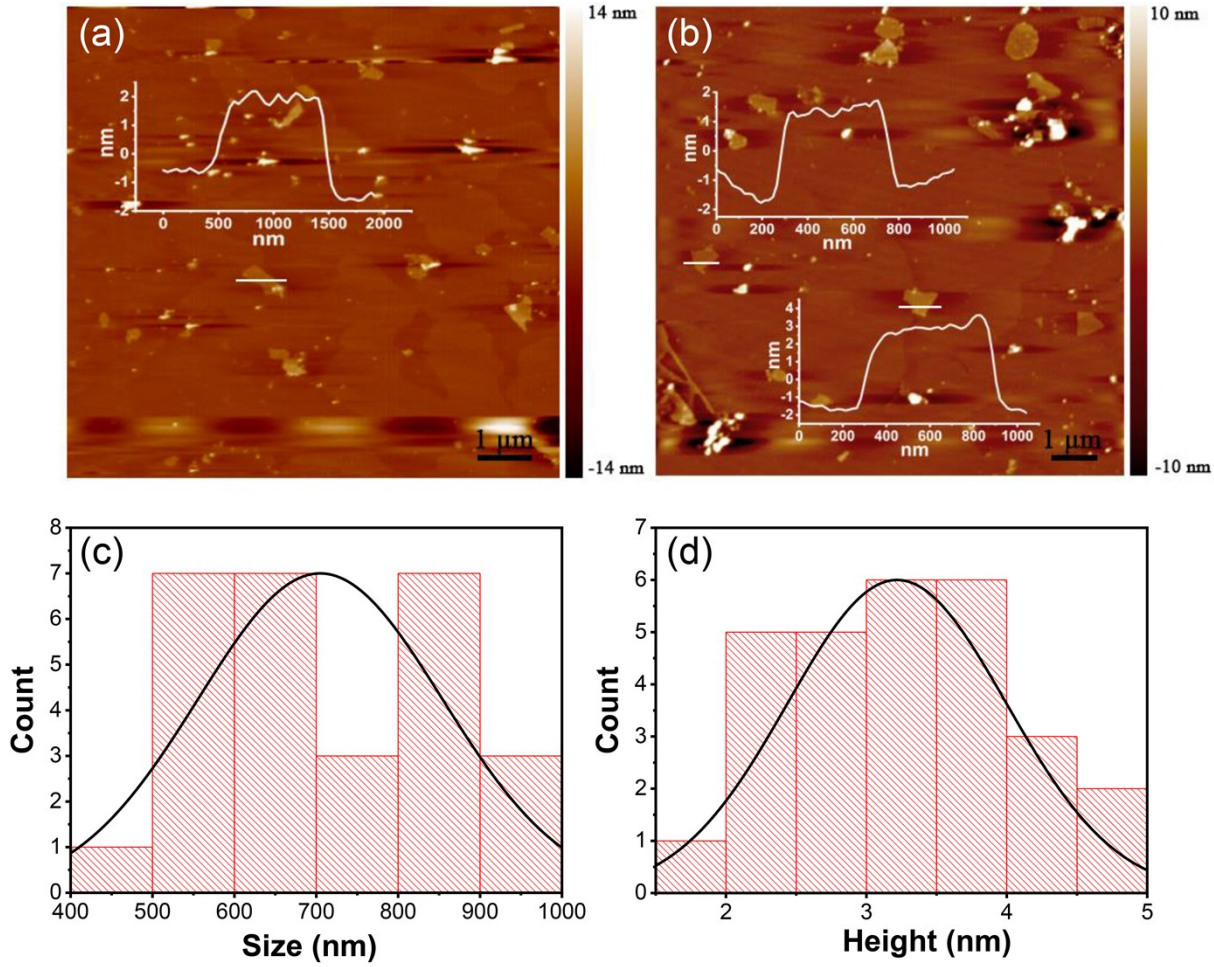


Figure S1. (a)-(b) Typical AFM images, (c) size and (d) height distribution analysis of the $Ti_3C_2T_x$ nanosheets.

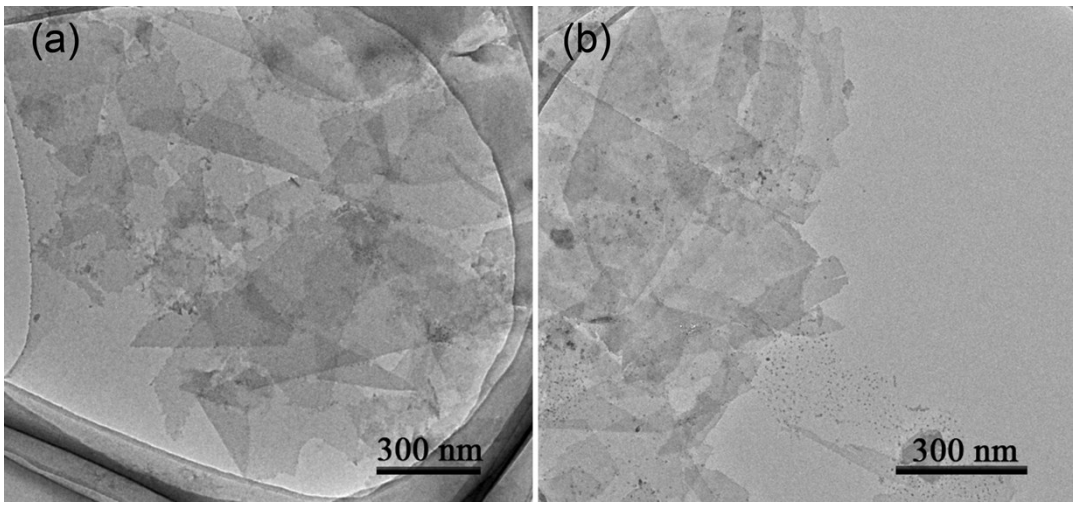


Figure S2. Typical TEM images of the $Ti_3C_2T_x$ nanosheets.

2. UV-vis-NIR absorbance spectra of composite hydrogel

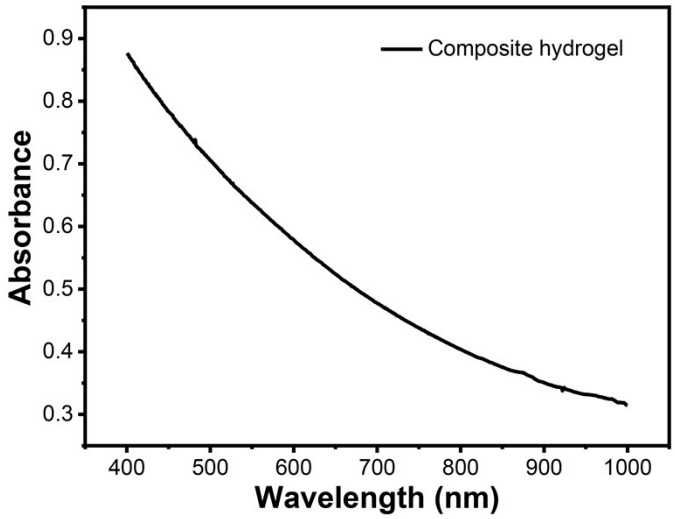


Figure S3. UV-vis-NIR absorbance spectra of composite hydrogel (with 0.1 mg ml^{-1} $Ti_2C_3T_x$ nanosheets)

3. Calculation of mass extinction coefficient

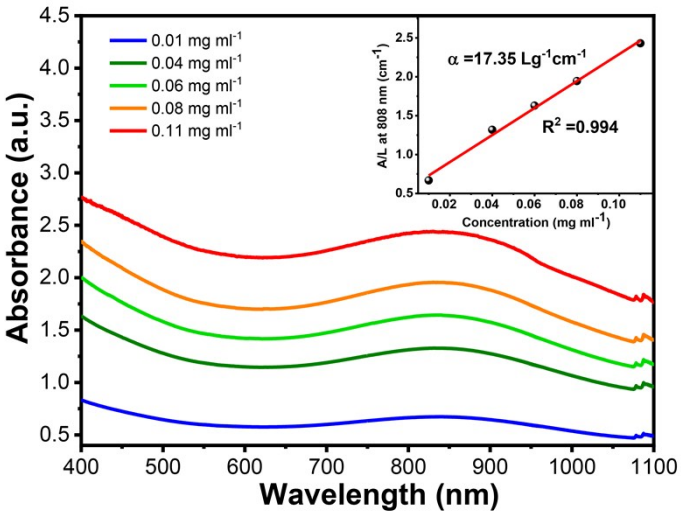


Figure S4. UV-vis-NIR absorbance spectra of $Ti_3C_2T_x$ nanosheets dispersed in water at different concentrations (0.11, 0.08, 0.06, 0.04, and 0.01 mg ml^{-1}). Inset: Beer law absorbance plot for absorption at 808 nm.

4. Compression tests

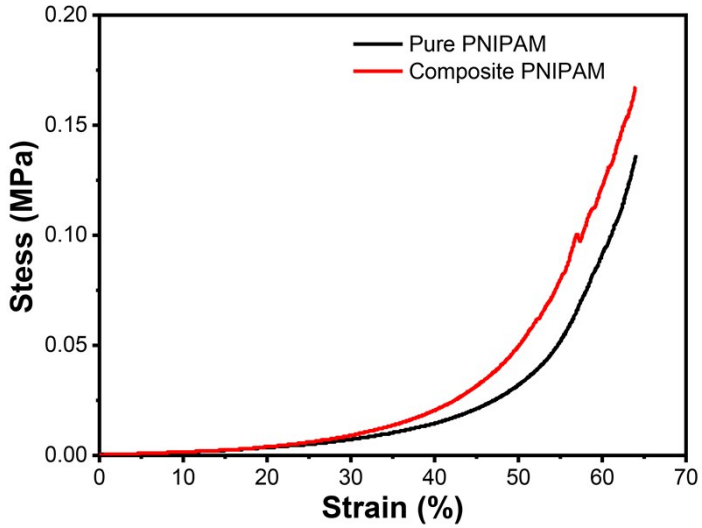
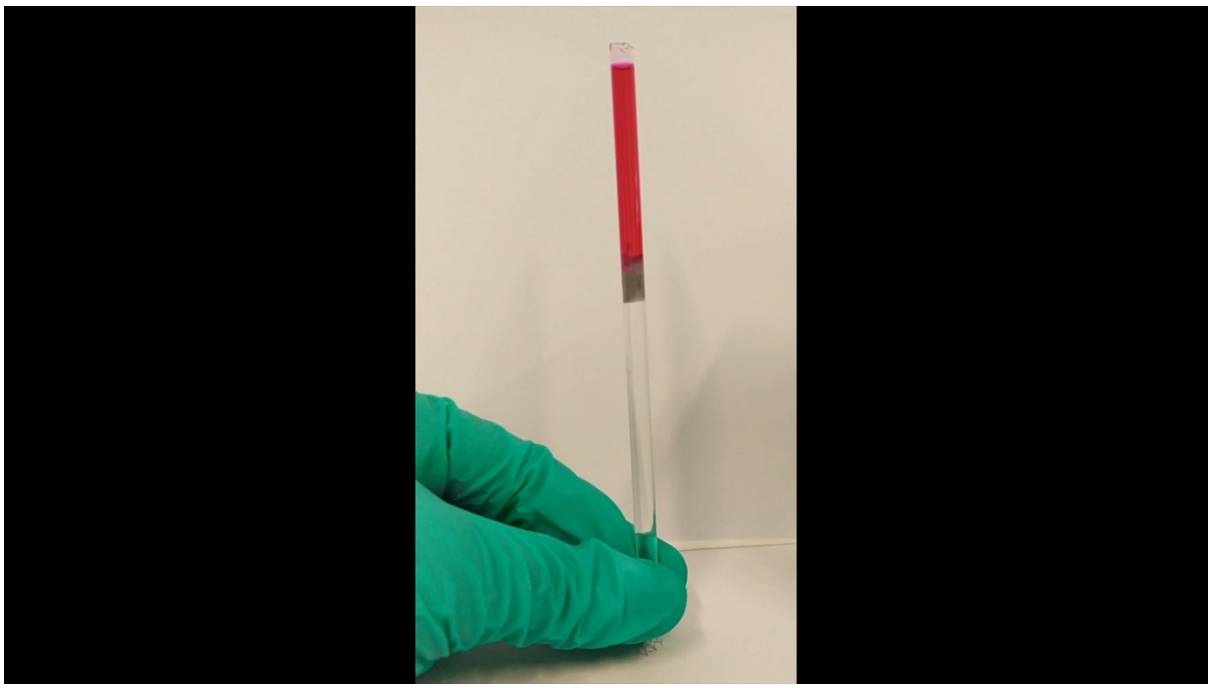


Figure S5. Stress-strain curves of pure PNIPAM and composite PNIPAM hydrogels.

5. Video to demonstrate that the gel-based valve was triggered ON via remotely coupled NIR irradiation



Video 1. Liquid microvalve controlled by NIR radiation (808 nm, 0.8 W)

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