

Supporting Information

Hybrid polyvinyl alcohol/molybdenum disulfide nanosheets hydrogel with light-triggered rapid self-healing capability

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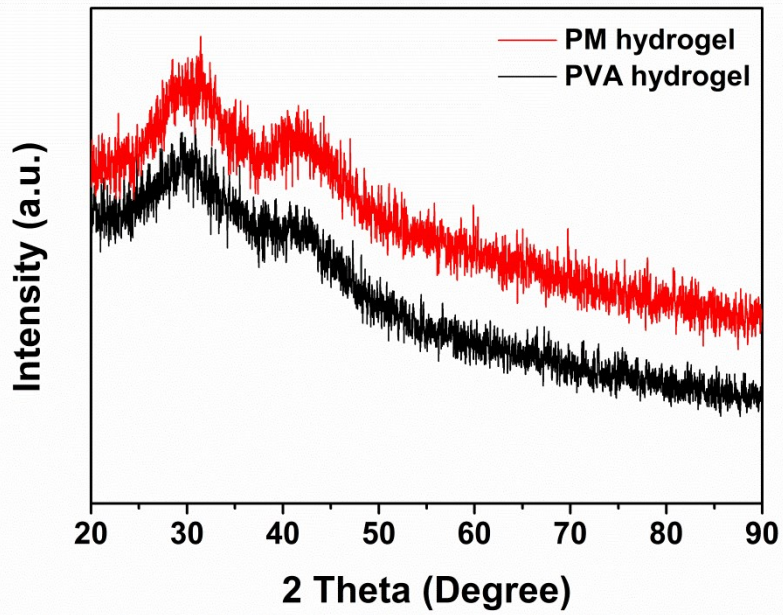


Figure S1 The XRD patterns of the PM hydrogel and PVA hydrogel.

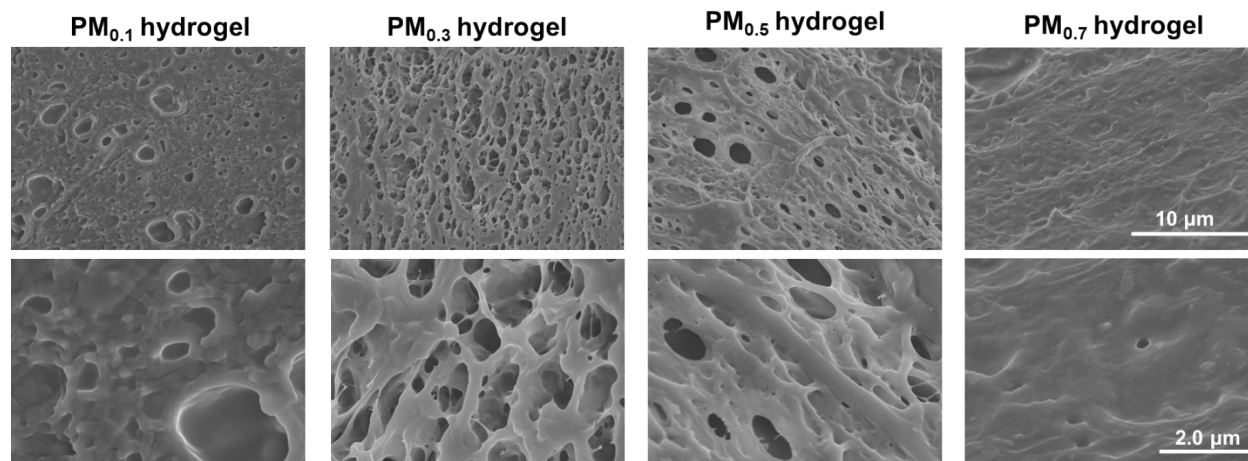


Figure S2 The SEM images for the inner morphologies of PM hydrogels with different ce-MoS₂ loadings.

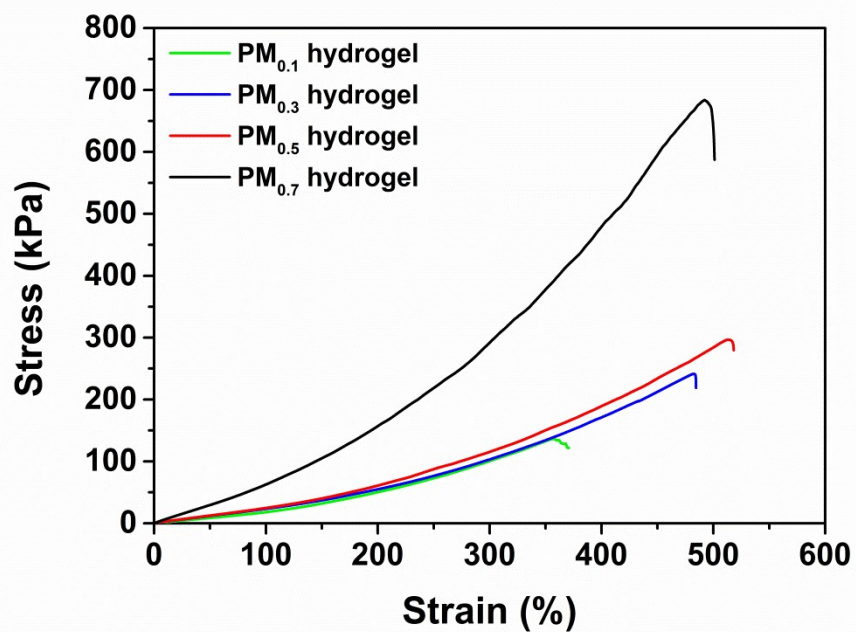


Figure S3 The stress-strain curves for the PM hydrogels with different ce-MoS₂ loadings.

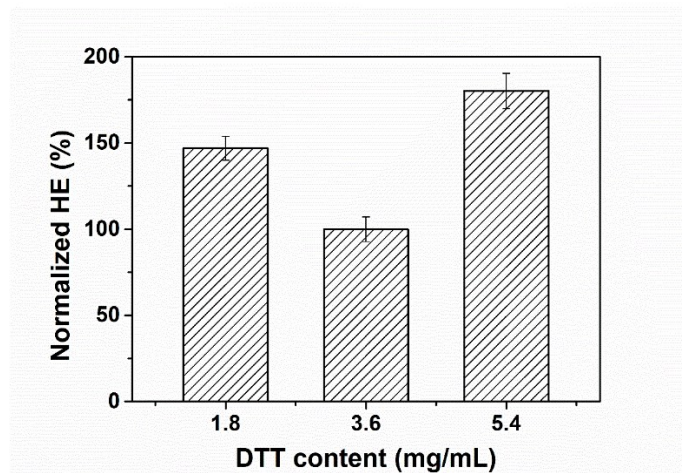


Figure S4 The normalized healing efficiency of the PM hydrogels with different DTT content of 1.8, 3.6 and 5.4 mg/mL.

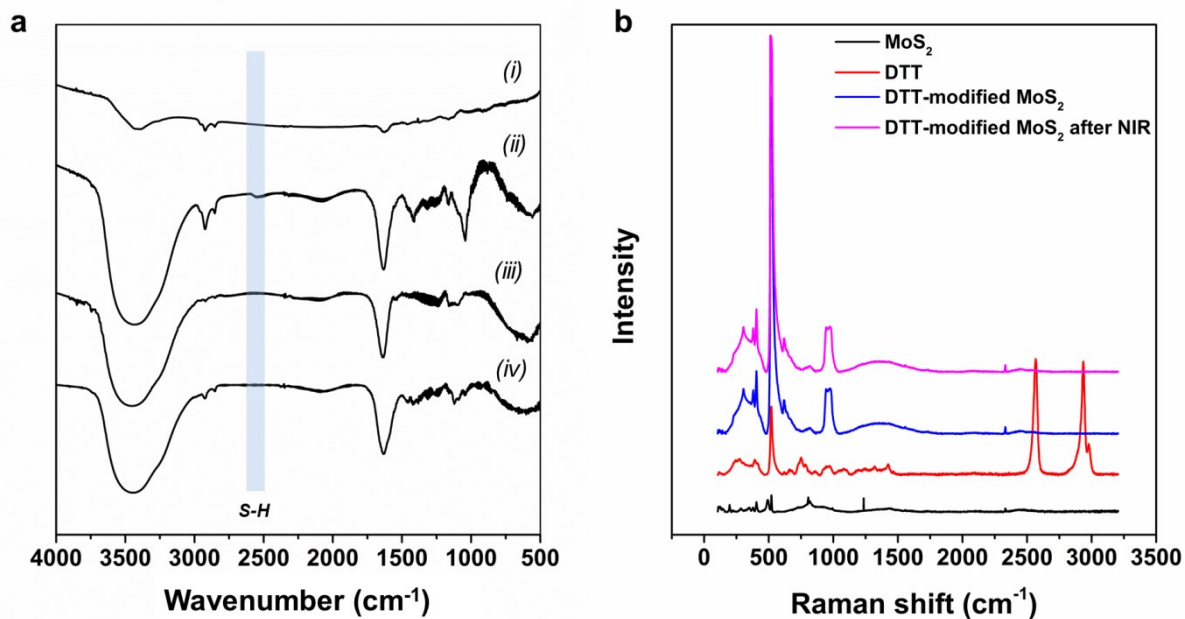


Figure S5 (a) The FT-IR absorption spectra of (i) MoS₂ nanosheets, (ii) DTT, (iii) DTT modified MoS₂ nanosheets and (iv) DTT modified MoS₂ nanosheets after NIR light irradiation. (b) The Raman spectra of MoS₂ nanosheets, DTT, DTT modified MoS₂ nanosheets and DTT modified MoS₂ nanosheets after NIR light irradiation.

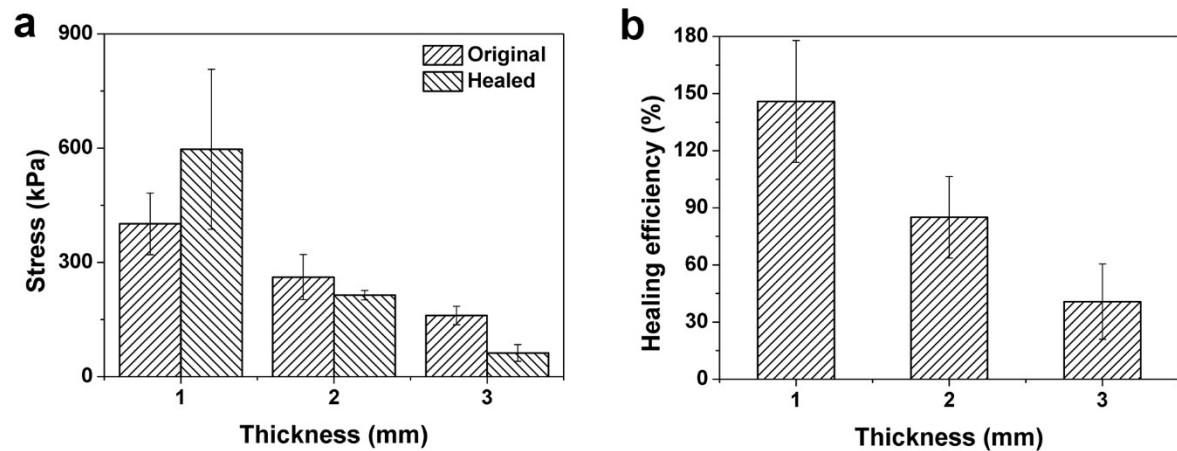


Figure S6 (a) The fracture stress of the original and healed PM hydrogels with different thickness of 1, 2 and 3 mm. (b) The healing efficiency of the PM hydrogels with different thickness of 1, 2 and 3 mm.

Table S1 Comparison of healing efficiency with other PVA-based hydrogel and hydrogen-bond based hydrogels

| Hydrogel | Healing time | Healing efficiency (%) | Separation time | Healing efficiency after separation (%) | Reference |
|--|--------------------|------------------------|-----------------|---|---|
| PVA | 1 hour 48 hours | 40 72 | 24 hours | Almost no self-healing ability | <i>ACS Macro Lett.</i> 2012 , 1, 1233-1236 |
| PVA-PEG | 1 hour 48 hours | 21 68 | - | - | <i>Langmuir</i> 2015 , 31, 11709-11716 |
| PVA/(PAM-co-PAA) | 12 hours | 37 | - | - | <i>ACS Appl. Mater. Interfaces</i> 2016 , 8, 24030-24037 |
| PAA/Agar/PVA | 24 hours | 72 | | | <i>Polymer</i> 2018 , 135, 16-24 |
| PVA/CP | 24 hours | 15-89 | 24 hours | 16 | <i>J. Polym. Res.</i> 2017 , 24, 127 |
| Dopamine-based poly(vinyl alcohol) | 48 hours | 20 | | | <i>J. Appl. Polym. Sci.</i> 2017 , 134, 45072. |
| Thermoplastic elastomers based on hydrogen-bonding brush polymer | | | 10 hours | ~46 | <i>Nat. Chem.</i> 2012 , 4, 467-472 |
| PVA/MoS₂ | 3-4 min | 91.8 | 24 hours | 60.6 | Our work |