Supporting Information

Regulating the compactness of Cu nanoclusters with assembly-induced emission properties for highly sensitive optical strain sensing

Xinbin Wang,†[a] Shan Chen,†[a] Yun Cai,*[b] Furong Wang,[a] Qinsong Zhang,[a] Farouk Meksen,[a] Jun Fang[a] and Yang Yang*[a]

[a] State Key Laboratory of Materials-Oriented Chemical Engineering, College of Chemical Engineering, Nanjing Tech University, Nanjing 211816, P. R. China.

* Email: yangy@njtech.edu.cn

[b] Quzhou Membrane Material Innovation Institute, Nanjing Tech University, Quzhou 324000, P. R. China

* Email: caiyun9126@163.com

† Xinbin Wang and Shan Chen made equal contribution to this work.

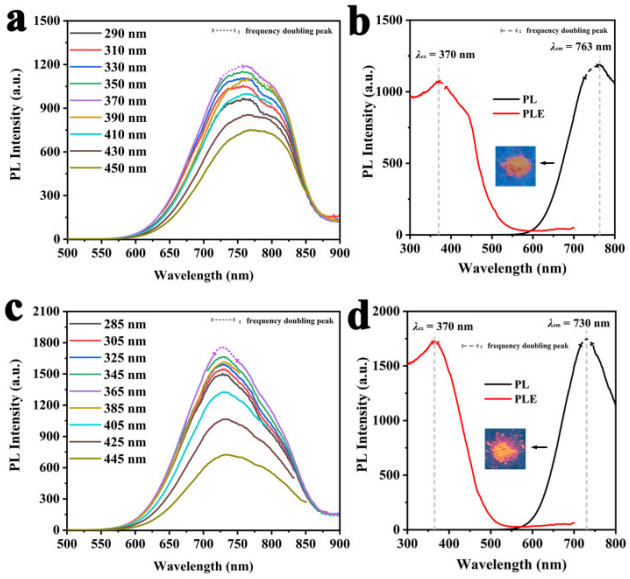

Fig. S1 PL spectra of (a) CuNCs-MP and (c) CuNCs-DMMP powder under different excitation wavelengths. Photoemission (black line) and photoexcitation (red line) spectra of (b) CuNCs-MP and (d) CuNCs-DMMP powder.

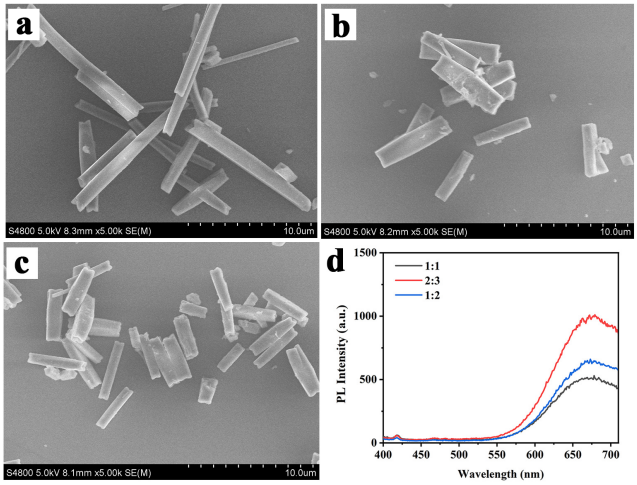

Fig. S2 SEM images of MMP-capped CuNCs assemblies with different Cu/MMP ratios: (a) 1:1, (b) 2:3, and (c) 1:2. (d) PL spectra of MMP-capped CuNCs assemblies with different Cu/MMP ratios.

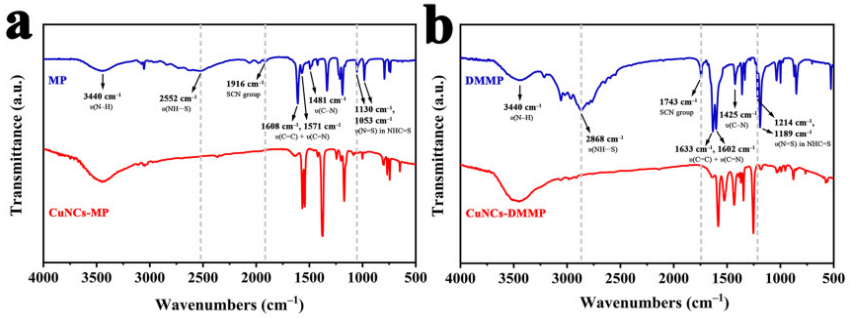

Fig. S3 FTIR spectra of (a) CuNCs-MP and (b) CuNCs-DMMP.

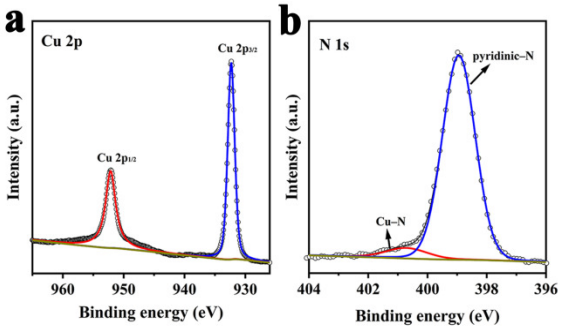

Fig. S4 XPS spectra of (a) Cu 2p and (b) N 1S of CuNCs-MMP.

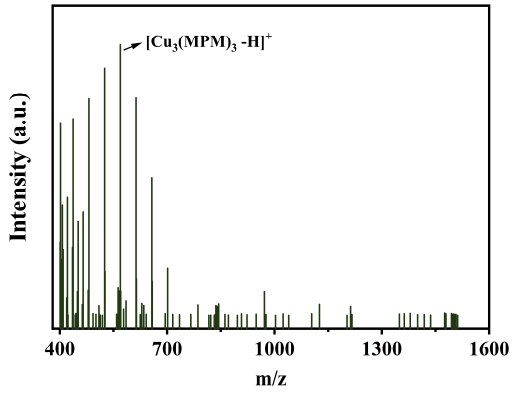

Fig. S5 ESI–MS spectrum of CuNCs-MMP.

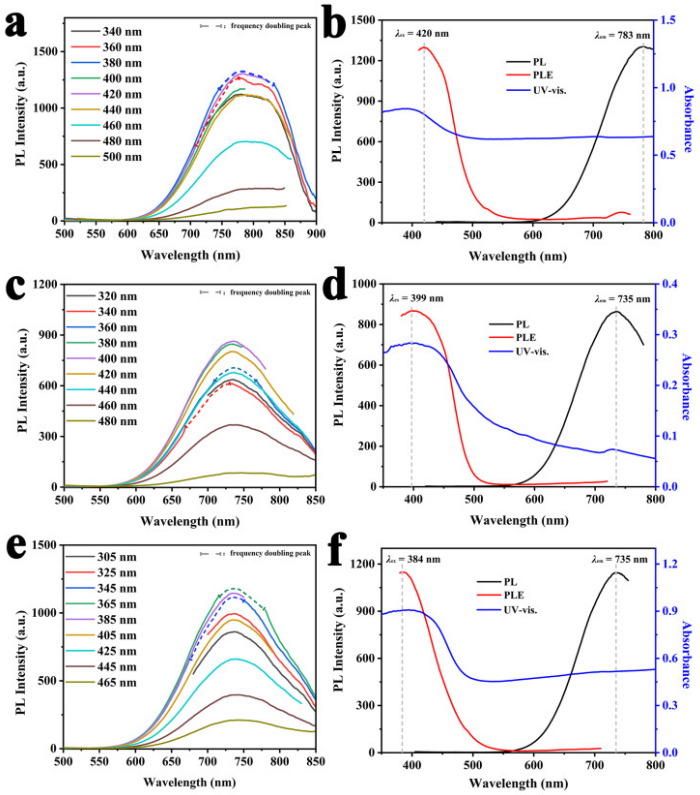

Fig. S6 PL spectra of (a) CuNCs-MP/PDMS, (c) CuNCs-MMP/PDMS and (e) CuNCs-DMMP/PDMS composite elastomers under different excitation wavelengths. Photoemission (black line), photoexcitation (red line) and UV–vis diffuse reflectance spectra (blue line) of (b) CuNCs-MP/PDMS, (d) CuNCs-MMP/PDMS and (f) CuNCs-DMMP/PDMS composite elastomers.

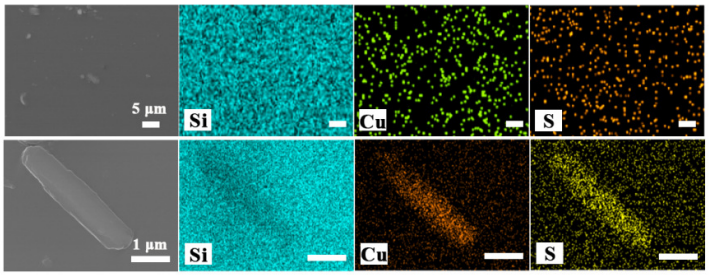

Fig. S7 SEM images with different magnifications and corresponding EDS mappings of surface of CuNCs-MMP/PDMS.

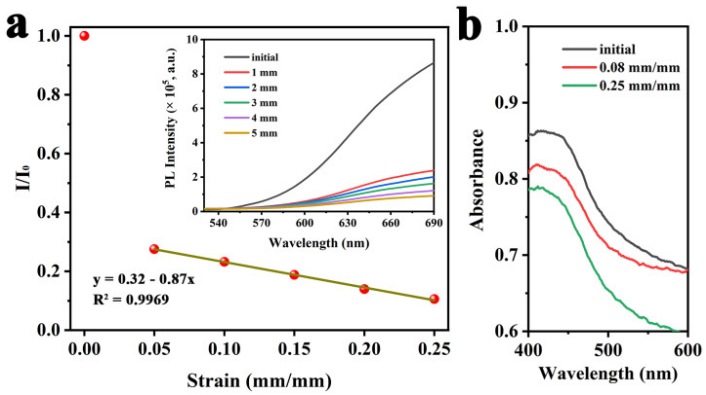

Fig. S8 (a) Plot of relative fluorescence intensity I/I_0 of CuNCs-MMP/PDMS composite elastomer as function of high stain, where I_0 is PL intensity at 690 nm of the sample at initial state; inset is collection of PL spectra obtained during high-strain tensile testing. (b) UV–vis diffuse reflectance spectra of CuNCs-MMP/PDMS at different strains.

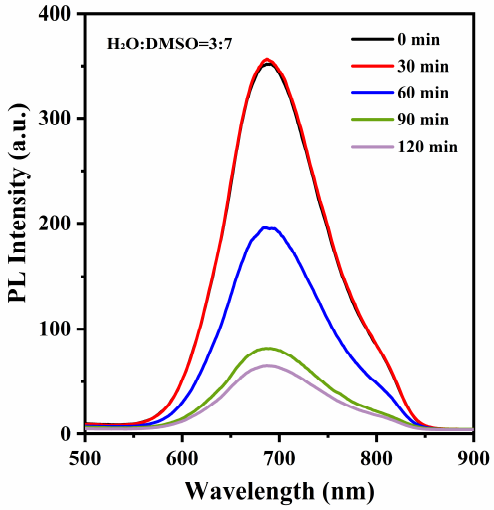

Fig. S9 Collection of PL spectra of CuNCs-MMP obtained in H_2O/DMSO mixture (H_2O:DMSO = 3:7) recorded at intervals of 30 min.