Supporting Information for Publication

Formation of S defects in MoS$_2$-coated Wood for High-Efficiency Seawater Desalination

Authors

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Fig. S1 Nitrogen adsorption-desorption curves (a) and pore diameter distribution curves (b) of NW, WM-H and WM-L.
**Fig. S2** SEM images of radial sections of natural wood (NW) (a and c) and MoS$_2$-coated wood (WM-H) (b and d).

**Fig. S3** Energy dispersive X-ray spectroscopy (EDX) images of NW (a), WM-H (b) and WM-L (c).
Fig. S4 Typical TEM and HRTEM images of NW (a and d), WM-H (b and e) and WM-L (c and f).

Fig. S5 Raman spectra of NW, WM-H and WM-L.
**Fig. S6** (a and b) C 1s spectra of NW and WM-L. (c and d) Mo 3d and S 2s XPS spectra of WM-L.

**Fig. S7** Absorption spectra of NW, WM-H and WM-L in the wavelength range of 200 nm to 2,500 nm.
**Fig. S8** Comparison of the surface temperatures of water, NW, WM-H and WM-L floating on water under 1 sun illumination.

**Fig. S9** Surface temperatures of natural wood, WM-H and WM-L floating on water after 60 min of solar illumination (0.5-2 sun).
Calculation details of the photothermal conversion efficiency

The photothermal conversion efficiency was obtained according to Eq. 1, where the net evaporation rate \( m \) is the evaporation rate of water under light conditions minus the evaporation rate of water under dark conditions. \( h_{LV} \) is calculated according to the following equations\(^1,2\):

\[
h_{LV,TS} = \int_{T_s}^{100^\circ C} C_{p,l} \, dT + h_{LV,100^\circ C} + \int_{100^\circ C}^{T_s} C_{p,v} \, dT
\]

\( h_{LV,100^\circ C} = 2257 \text{ J} \cdot \text{g}^{-1} \) \hspace{1cm} (S2)

\( C_{p,l} = 4.1813 \text{ J} \cdot \text{K}^{-1} \cdot \text{g}^{-1} \) \hspace{1cm} (S3)

\( C_{p,v} = (3.470 + 1.45 \times 10^{-3} \times T + 0.121 \times 10^{5} \times T^{-2}) \cdot R \text{ (J} \cdot \text{K}^{-1} \cdot \text{mol}) \) \hspace{1cm} (S4)

\( R = 8.314 \text{ J} \cdot \text{K}^{-1} \cdot \text{mol} \) \hspace{1cm} (S5)

\( T \) is the temperature in Kelvin.

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Fig. S10 Drops of water on the MoS\(_2\)-coated wood can be quickly absorbed.

Fig. S11 Mass changes and water evaporation rates of wood with different thicknesses.
**Fig. S12** Evaporation rates of water, NW, WM-H and WM-L under dark conditions.

**Fig. S13** Solar thermal purification of Ni$^{2+}$, Cu$^{2+}$, Zn$^{2+}$ and Pb$^{2+}$ with WM-H in an actual seawater sample under one sun illumination. The actual seawater samples were taken from the Bohai Sea, Tianjin, China.

**Fig. S14** Atomic structures of MoS$_2$ without (a) and with (b) defects.
References:
