Supporting information

Self-healing of a pre-notched WS$_2$/a-C coating

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Figure S1. (a) The tribofilm acting as a band-aid patching the pre-notched crack in the wear track; (b-c) thick and continuous tribofilm as revealed at the edge of the wear track after dry sliding.
Figure S2. EDS mapping of S, W, C, O distribution as indicated corresponding to the view field of Figure 1d.
Figure S3. Corresponding selected area electron diffraction (SAED) patterns of areas 1-4 in Fig. 3a: (a) top protective Pt, (b) Ga⁺ ion damaged gradient area from Pt to tribofilm with weak ring of WS₂, (c) the tribofilm filled into the cracked valley confirming both WS₂ and WO₃, (d) pristine coating showing mainly amorphous WS₂. Note (1) Pt JCPDS No. 04-0802; WS₂ JCPDS No. 08-0237; WO₃ JCPDS No. 43-1035 and (2) 10Z (Z=0, 1, 2,…stacking planes).
Figure S4. (a) At low magnification cross-section TEM image of the top part of the tribofilm filled into the cracked valley; (b) HR-TEM image showing perfectly aligned WS$_2$ (002) platelets parallel to the ball sliding direction (e.g. the coating surface).
Figure S5. HR-TEM images of pristine WS$_2$/a-C coating with random and short WS$_2$ (002) platelets (< 5 nm in length): (a) overview at lower magnification; (b) at high magnification.
Figure S6. HR-TEM images indicating the negative effect of WO$_3$ in the tribofilm on the WS$_2$ (002) basal plane reordering: (a) blocking and (b) diverging.