Electronic Supplementary Material

Tribological properties of novel palygorskite nanoplatelets used as oil-based lubricant additives

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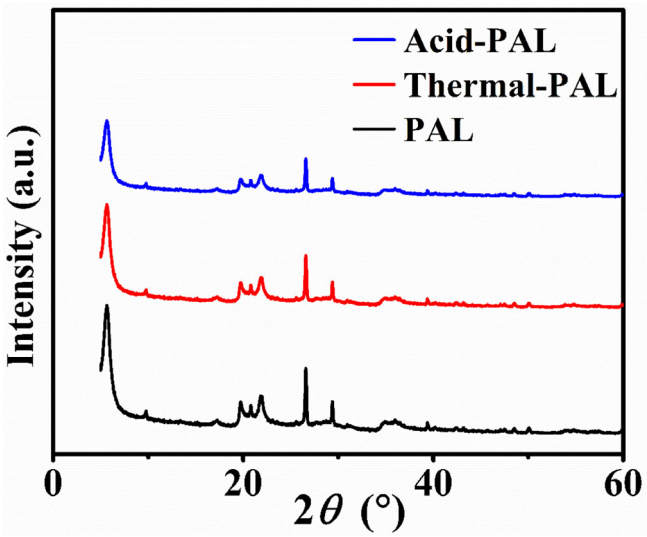

Fig. S1 XRD patterns of AMO-PMo prepared with the novel method and obtained for thin layers of materials coated on glass plates (Cu radiation; scanning rate: 2 (°)/min).

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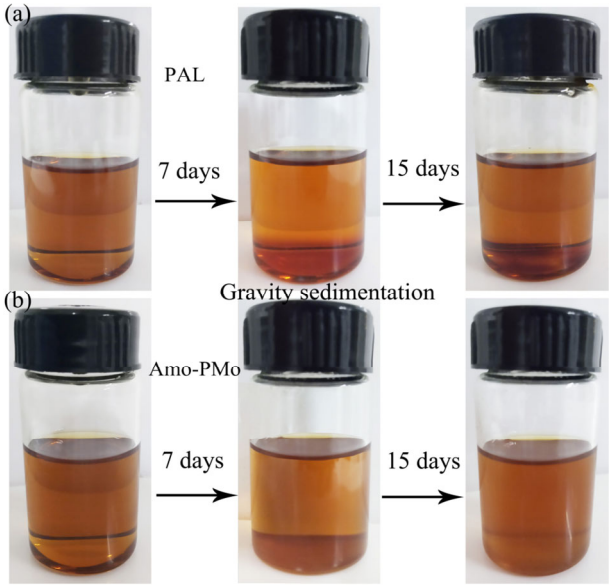

Fig. S2 Gravity sedimentation experiment: (a) unmodified PAL and (b) Amo-Pmo.

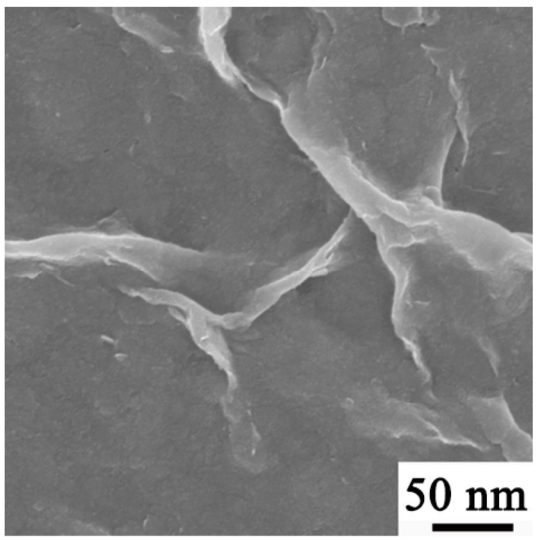

Fig. S3 SEM image of the synthesized Amo-PMo edge topography.

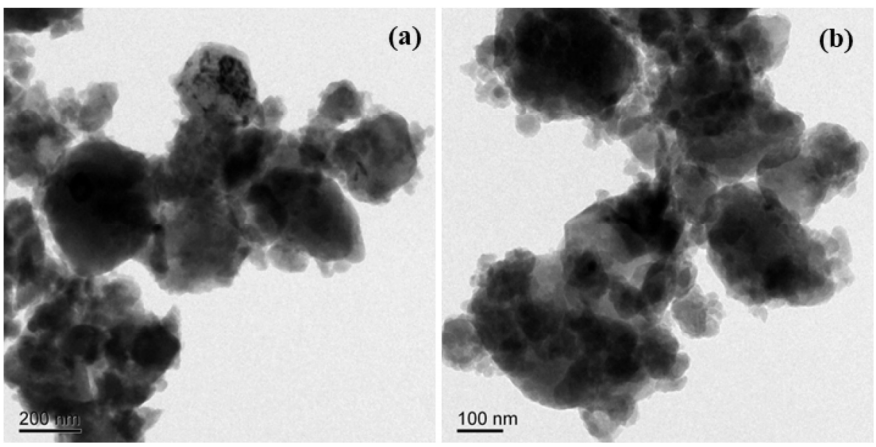

Fig. S4 TEM images of the PAL prepared without APTES modification: (a) low magnification and (b) high magnification.

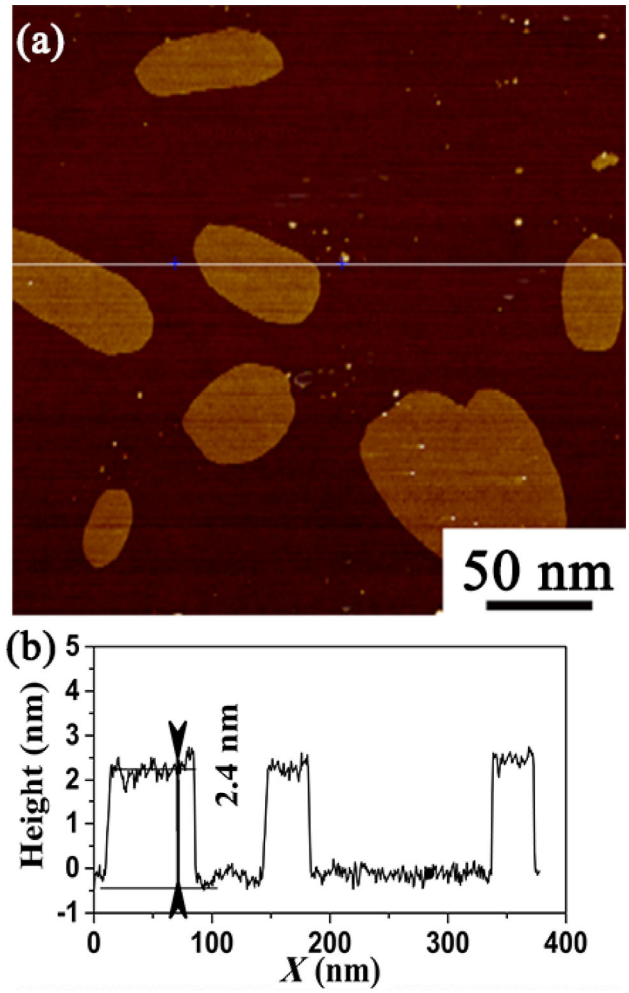

Fig. S5 (a) AFM image (obtained using tapping mode) of Amo-PMo in cyclohexane (0.1 g/L) deposited on a mica substrate. (b) The height profile was measured along the marked white line in the AFM image, showing single and shows single and double layers of Amo-PMo.

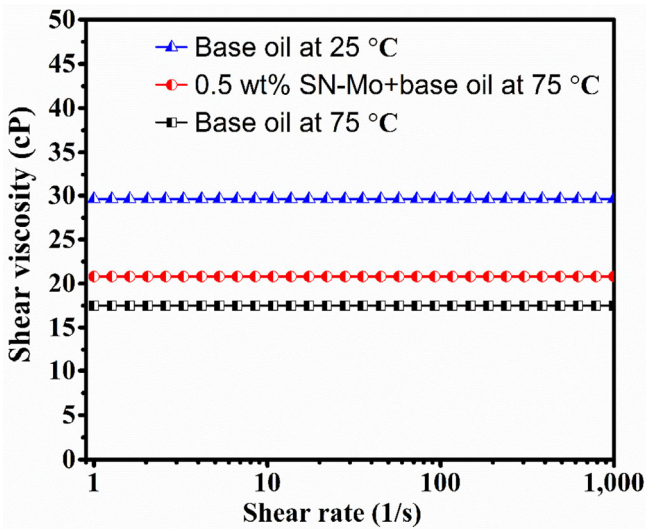

Fig. S6 Viscosity of the lubricating fluid and the base oil at shear rates from 10 to 1,000 s^{-1}.

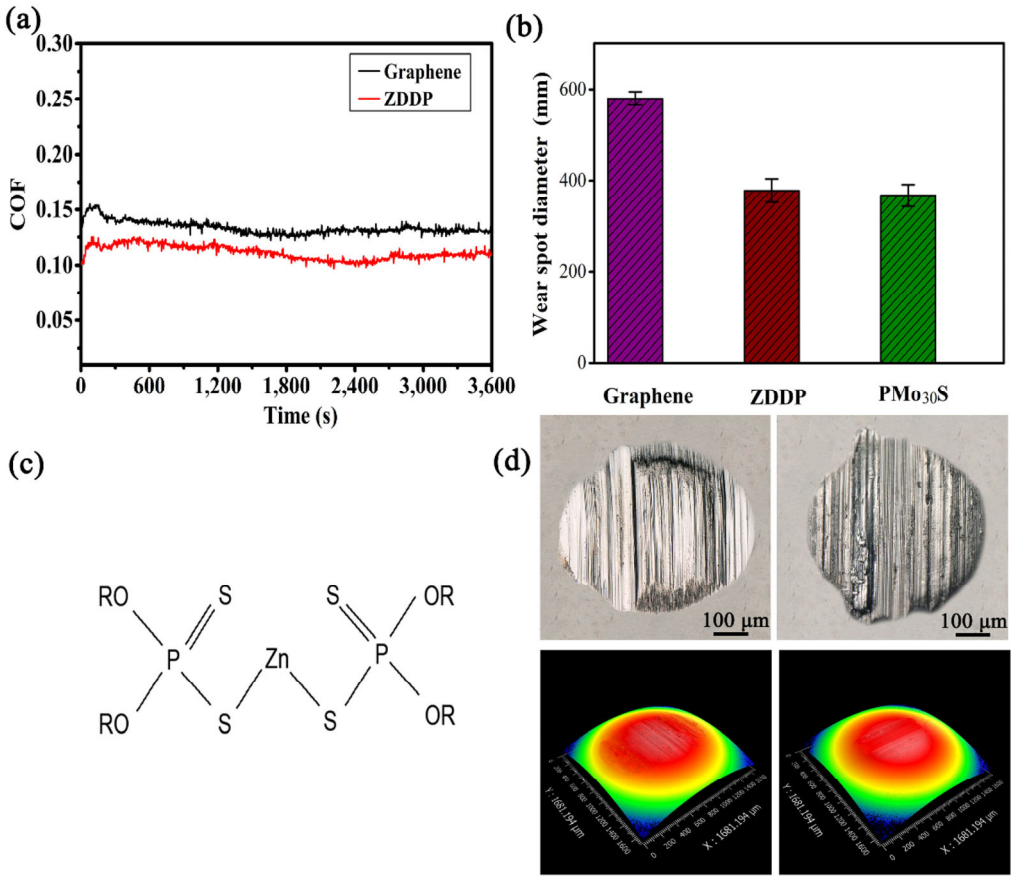

Fig. S7 (a) COF as a function of time, obtained by testing the lubricants containing 0.5 wt% graphene and ZDDP. (b) Histogram of the wear spot diameter for the lubricants with different graphene, ZDDP, and $PMo_{30}S$ contents. (c) Molecular formulas of ZDDP. (d) Optical images of the wear scars tested for graphene and ZDDP.

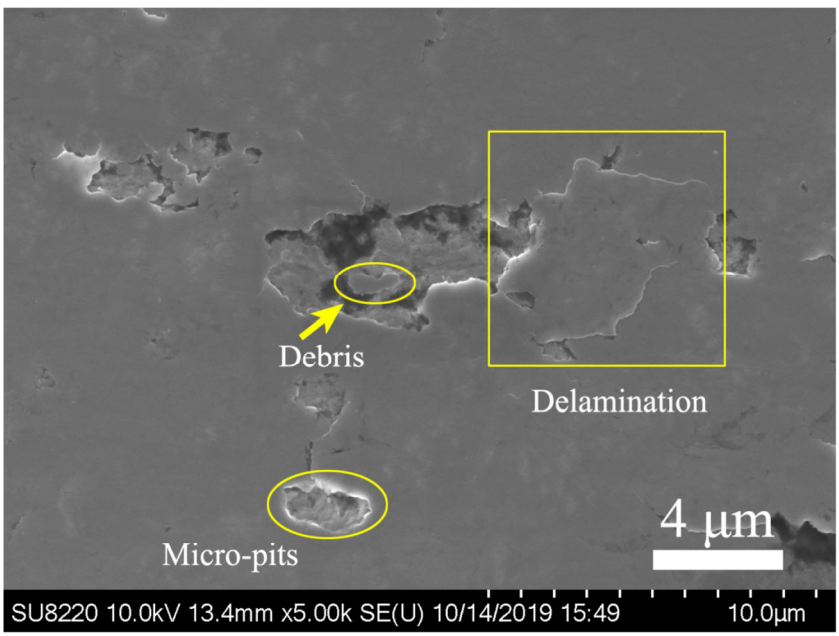

Fig. S8 SEM images of the surfaces tested with the base oil after running for 1 h.

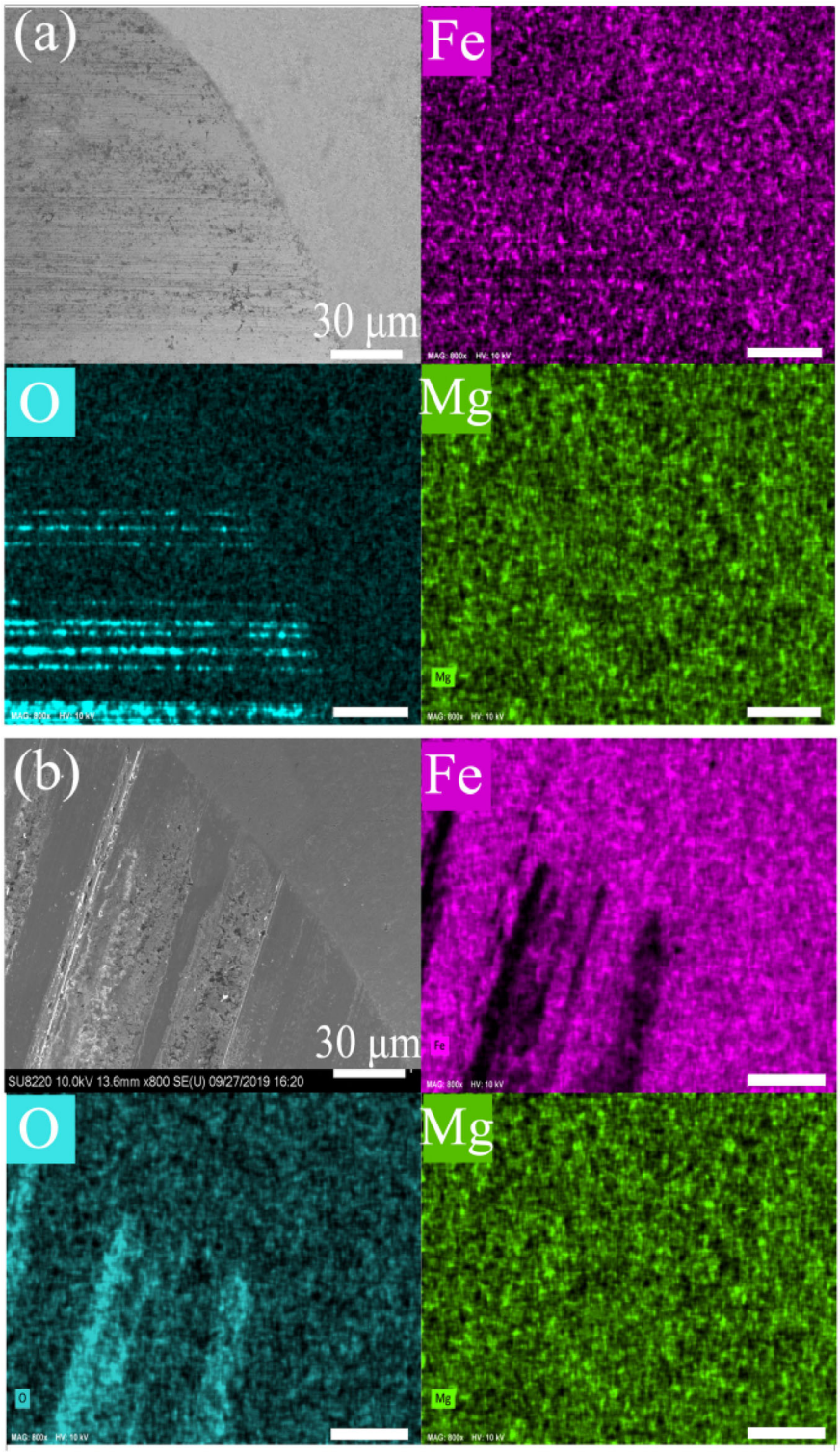

Fig. S9 EDS mapping analysis for the wear surface lubricated by (a) the base oil and (b) 0.5 wt% PAL.

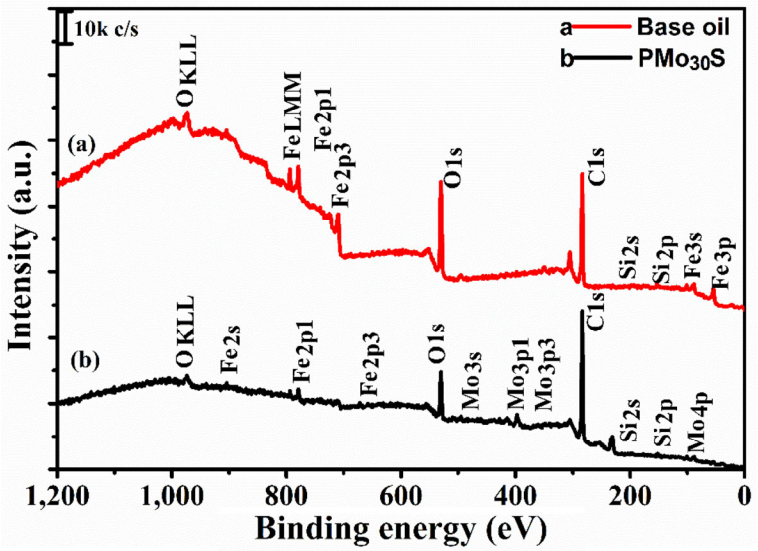

Fig. S10 XPS surface analysis of the samples: (a) the base oil and (b) $PMo_{30}S$.

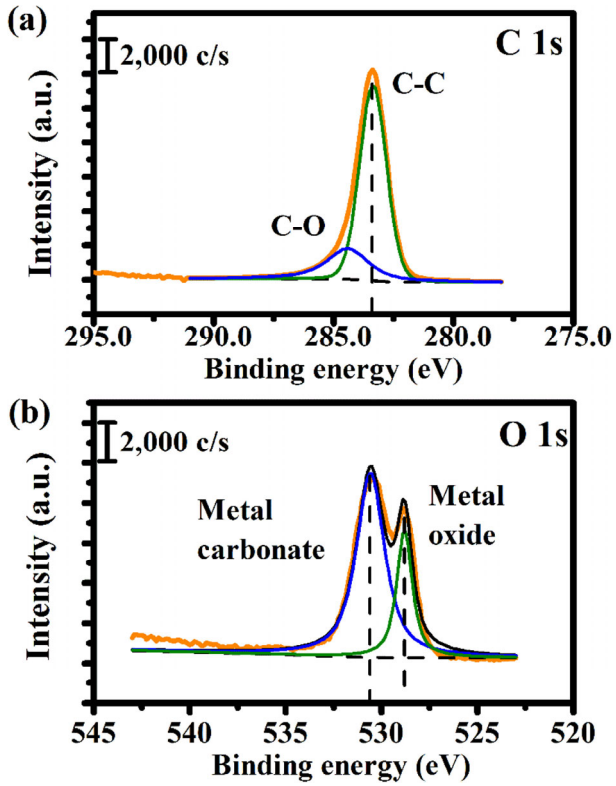

Fig. S11 XPS spectra of the elements on the surface of the $PMo_{30}S$ sample: (a) C XPS spectrum and (b) O XPS spectrum.