Supplementary Information for

Construct the continuously layered structure of h-BN nanosheets in liquid phase via sonication induced gelation to achieve low friction and wear

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Table S1. The acronyms and corresponding meanings used in the present work.

Acronyms	Meaning
TDI	Toluene-2, 4-diisocyanate
ODA	Octadecylamine
PAO10	Polymerized alpha olefin oil
MOB	1-methyl-2, 4-bis (N-octadecylurea) benzene;(The diurea compound decorated on the surface of h-BN nanosheets)
h-BN-TDI	The h-BN nanosheets decorated with TDI
BTO	The gelator in the present work
COF	Coefficient of friction

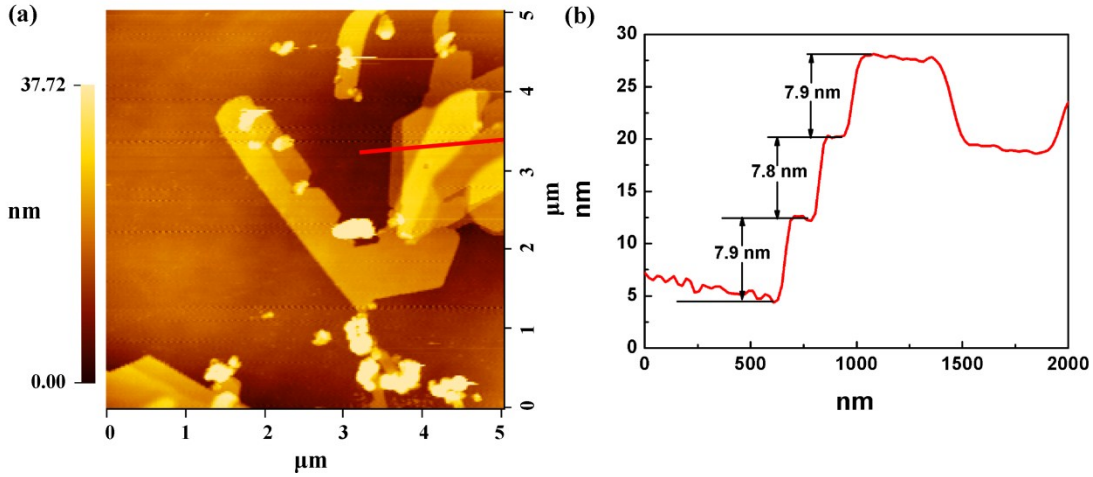

Fig. S1 The AFM image of exfoliated h-BN nanosheets.

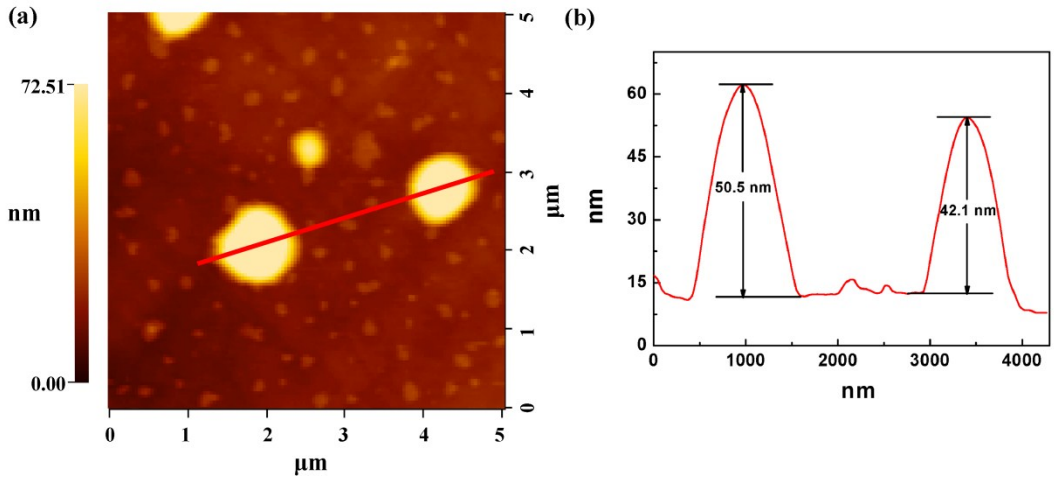

Fig. S2 The AFM image of BTO nanosheets.

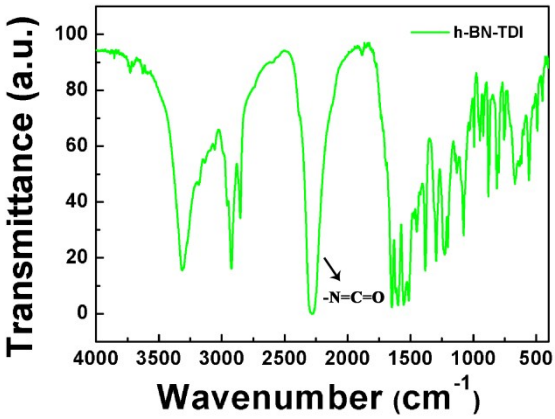

Fig. S3 The IR spectra of h-BN-TDI.

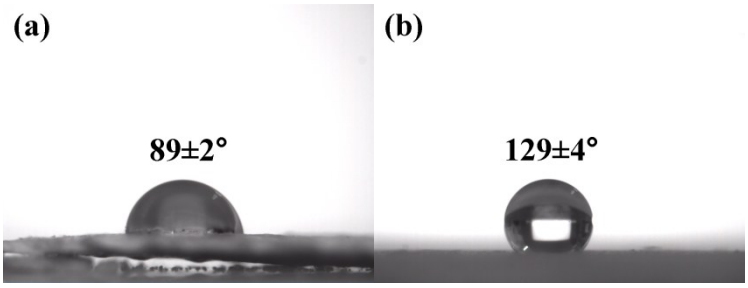

Fig. S4 The contact angles of water droplet on (a) pristine h-BN, (b) BTO.

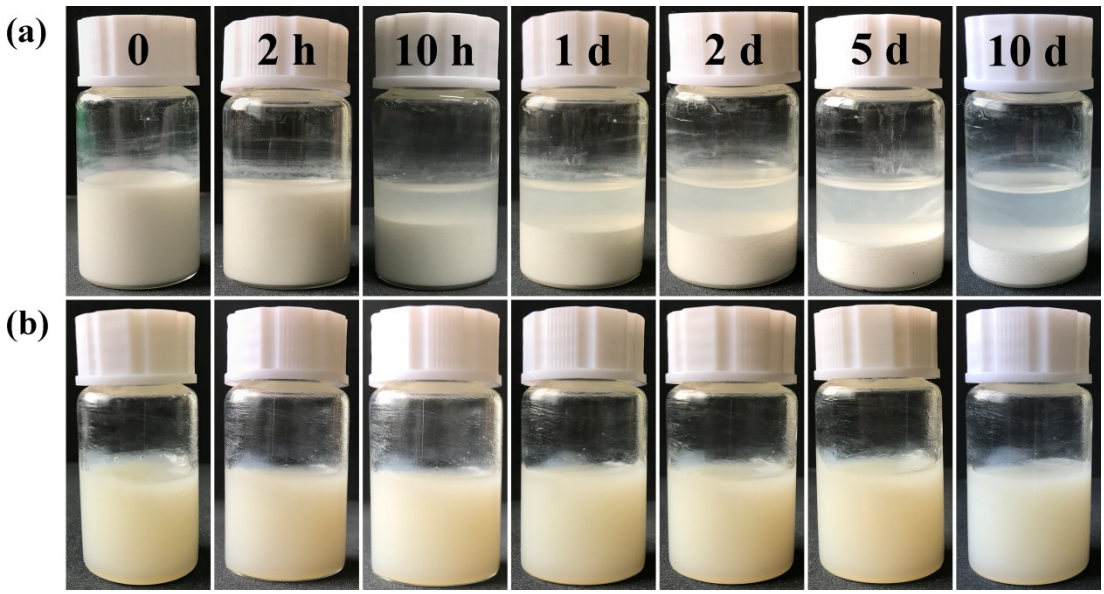

Fig. S5 The digital pictures about the sedimentation processes of (a) PAO10-3% BN and (b) PAO10-3% BTO.

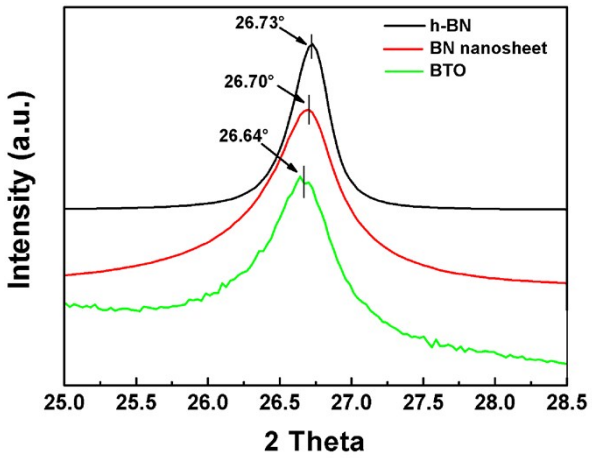

Fig. S6 The details of the peak about (002) crystal surface of h-BN, exfoliated BN nanosheet and BTO.

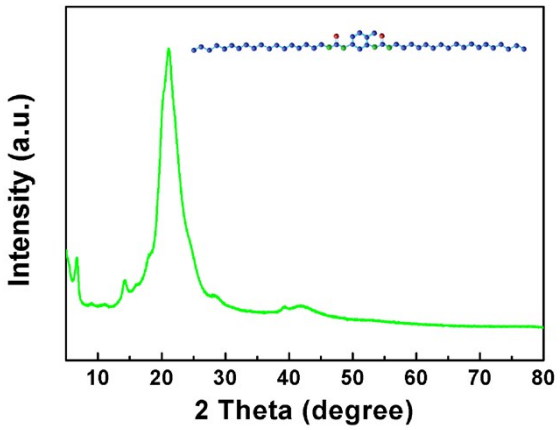

Fig. S7 The XRD spectra of MOB

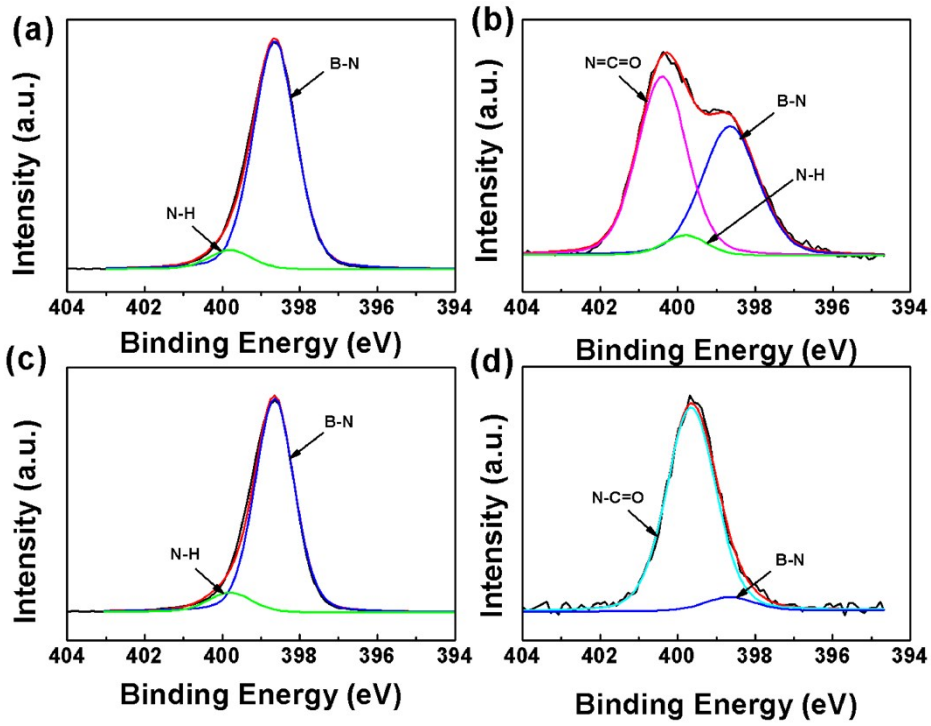

Fig. S8 The XPS of N1s spectra of (a) exfoliated h-BN nanosheets (b) h-BN-TDI (c) h-BN-TDI after removing the adsorbed TDI molecules (d) BTO.

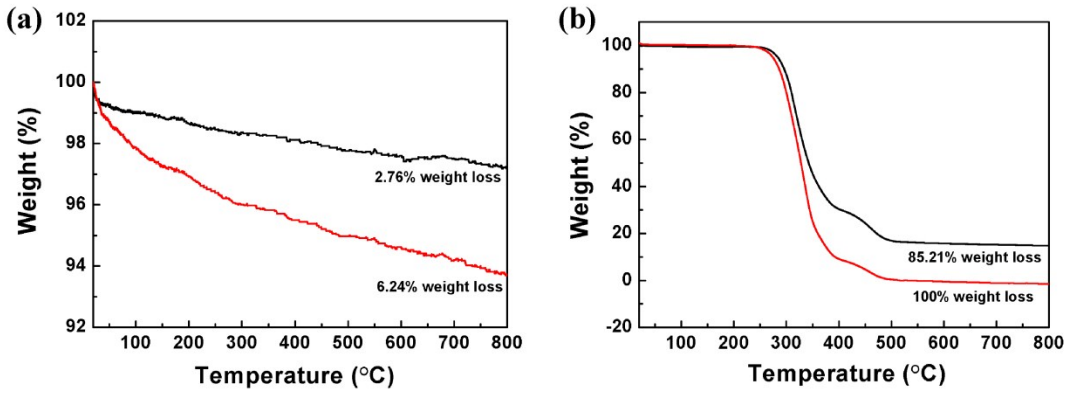

Fig. S9. TGA curves of (a) pristine h-BN and exfoliated h-BN nanosheet, (b) BTO nanosheets and MOB which is the diurea compound decorated on the BTO.

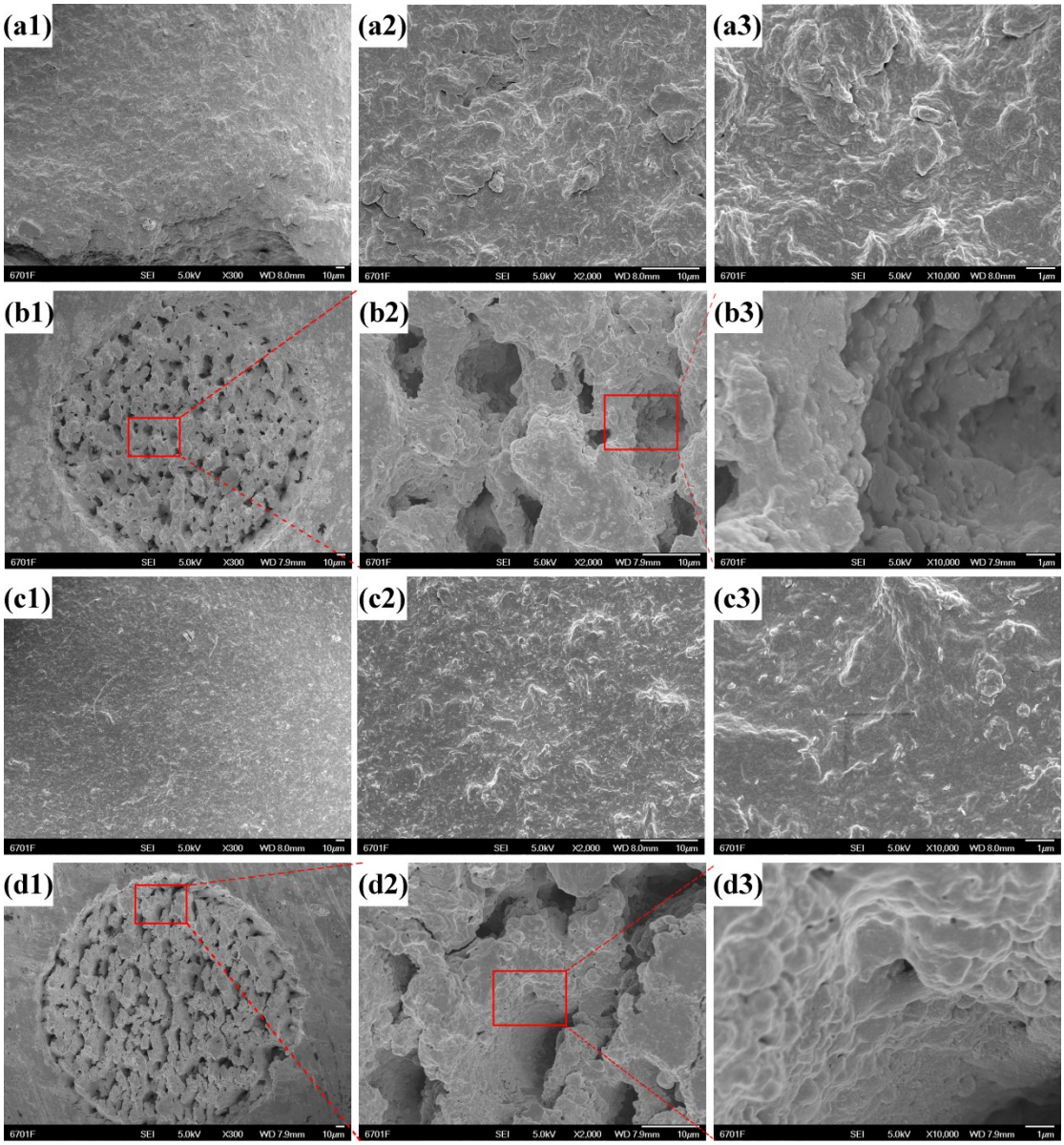

Fig. S10. The SEM images of (a) the plane morphology and (b) stereoscopic structure of BTO xerogel formed by BTO/dodecane system, (c) the plane morphology and (d) stereoscopic structure of BTO xerogel formed by BTO/PAO10 system.

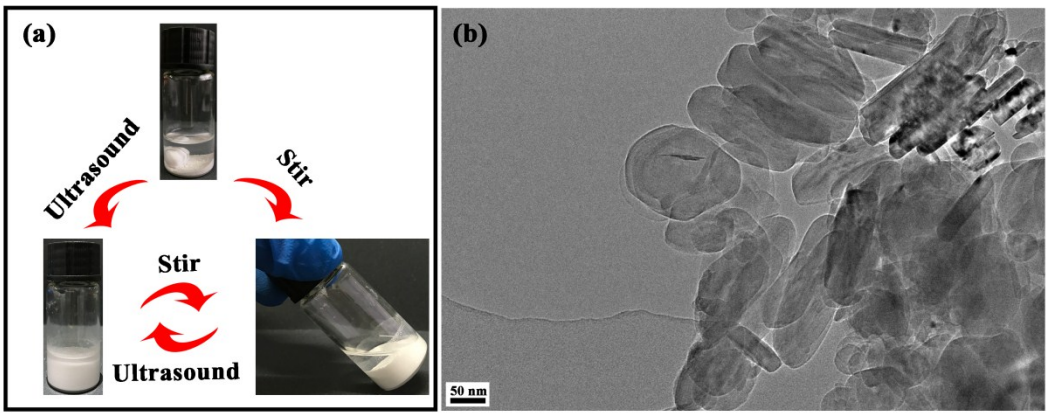

Fig. S11 (a) The effects of ultrasound and stirring on pristine h-BN in petroleum ether. (b) The morphology of h-BN after sonication in petroleum ether.

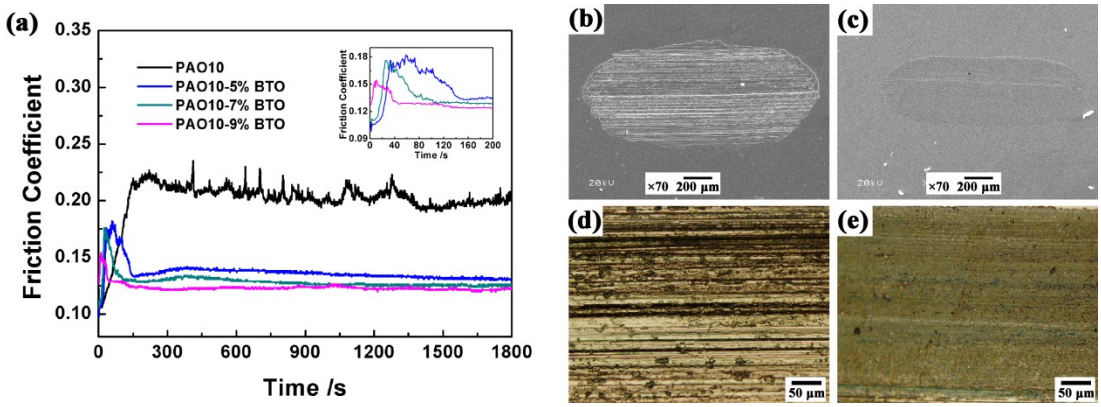

Fig. S12. (a) the friction curves of the steel contacts lubricated by PAO10 base oil and PAO10 with different contents of BTO, the inset in Fig. S12a shows the details of friction curves of BTO gels in the running-in period. And the SEM images and OM images of worn surfaces lubricated by (b) (d) PAO10, (c) (e) BTO gel-9%.

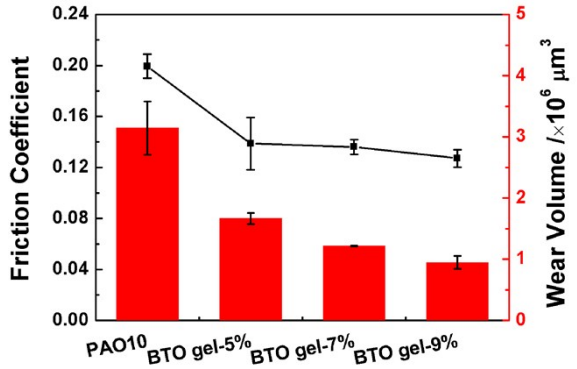

Fig. S13 The mean values of COF and wear volumes of the steel contacts lubricated by PAO10 base oil and BTO/PAO10 gel with different contents of BTO gelator.

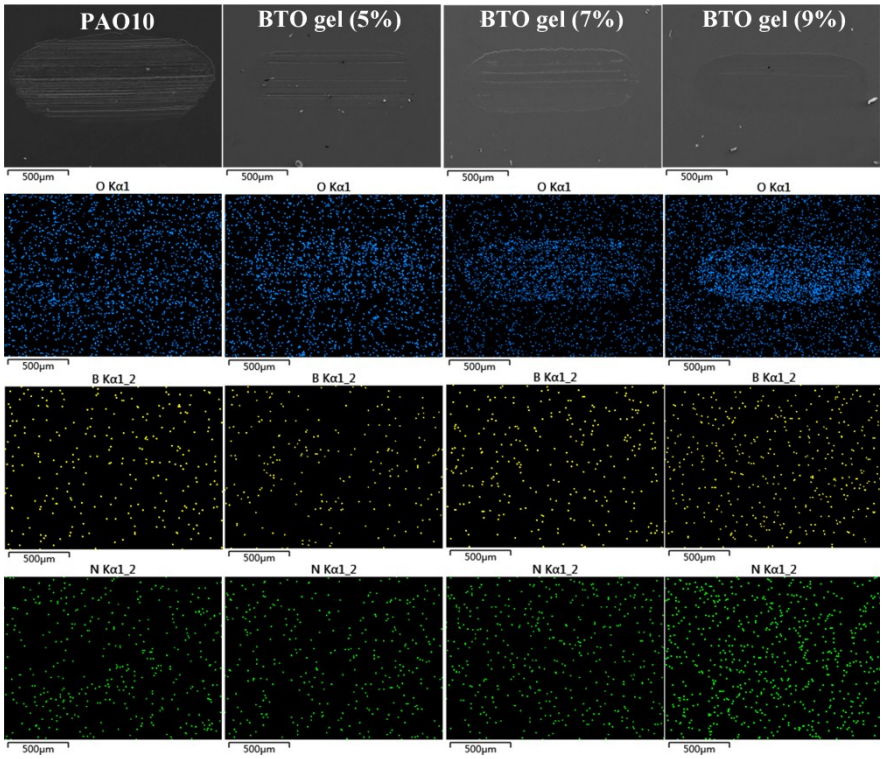

Fig. S14 The distribution of O, B and N on the worn surfaces lubricated by PAO10 and PAO10 added with different contents of BTO gelator.

Table S2. The contents of O on the wear scars lubricated by PAO10 and PAO10 with different contents of BTO

Lubricant	O content /wt%
PAO10	2.77
BTO gel-5%	3.98
BTO gel-7%	6.16
BTO gel-9%	8.84

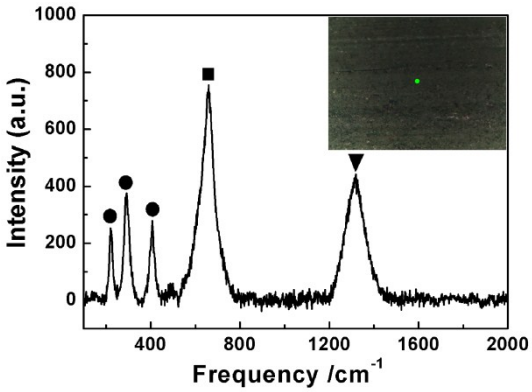

Fig. S15. The Raman spectra of wear scar lubricated by BTO gel-9%.

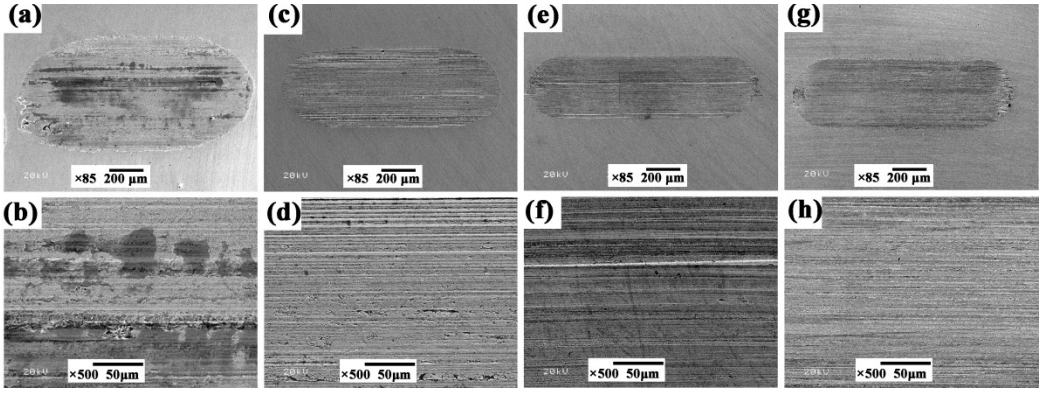

Fig. S16 The wear scars lubricated by (a) (b) Dodecane-5% BTO-sol, (c) (d) Dodecane-5% BTO-gel, (e) (f) PAO10-5% BTO-sol and (g) (h) PAO10-5% BTO-gel.

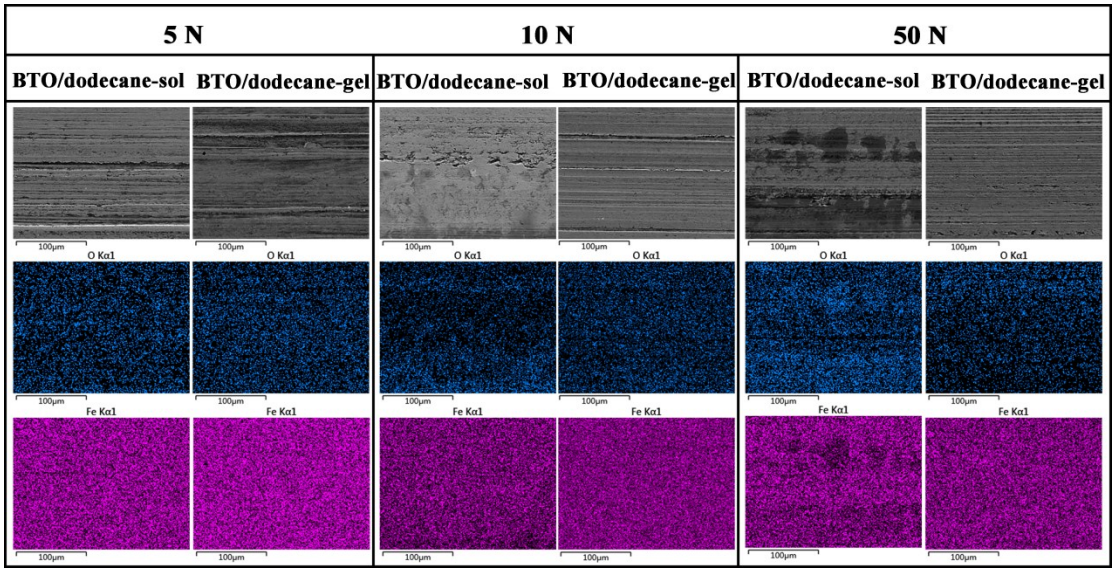

Fig. S17 The SEM images and the corresponding O and Fe distribution of worn surfaces lubricated by BTO/dodecane in sol and gel state under the normal load of 5 N, 10 N and 50 N