Electronic Supplementary Material

AFM probe with the U-shaped cross-sectional cantilever for measuring the ultra-low coefficient of friction of 10^{-6}

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Table S1 summarizes the recent advancements in the superlubricity research using atomic force microscopy (AFM). The corresponding coefficient of friction (COF) values, the AFM probes, and the friction pairs are provided.

Table S1 Recent advancements in the superlubricity research using AFM (BP: black phosphorus; MLG: multilayer graphene; h-BN: hexagonal boron nitride; C_{16}TAB: hexadecyltrimethylammonium bromide; SAFMs: self-assembled fluoroalkyl monolayers).

No.	COF	AFM probe	Friction pair	Ref.
1	0.007	TL-CONT (Nanosensor)	Ti6Al4V/polymer in liposome solution	Duan et al. (2019) [S1]
2	0.006	Si AFM probe	Oxidized BP/nonanoic acid in nonanoic acid solution	Li et al. (2022) [S2]
3	0.003	PPP-CONTR (Nanosensor)	WS_2/graphene in air	Tian et al. (2020) [S3]
4	0.003	ARROW-TL1 (Nanoworld)	MoS_2/MoS_2 in oil	Li et al. (2022) [S4]
5	0.0025	TL-FM (Nanosensor)	MLG/h-BN in air	Liu et al. (2017) [S5]
6	0.0007	TL-CONT (Nanosensor)	SiO_2/SiO_2 in C_{16}TAB solution	Li et al. (2016) [S6]
7	0.0003	Multi75Al-G (Budgetsensors)	graphite/graphite in air	Li et al. (2018) [S7]
8	0.0003	TL-CONT (Nanosensor)	graphene/SAFMs in water	Li et al. (2019) [S8]
9	0.00016	VIT-P (NT-MDT)	graphite flakes/graphite flakes in air	Deng et al. (2018) [S9]
10	0.0001	AC240 (Olympus)	2D flakes/layered bulk materials in air	Liu et al. (2018) [S10]
11	0.00005	PPP-CONTR (Nanosensor)	Si/MoS_2 in ultrahigh vacuum	Song et al. (2022) [S11]
12	0.00004	Si AFM probe	graphite/graphite in ultrahigh vacuum	Liu et al. (2020) [S12]

Figure S1 shows the adhesion forces between the AFM probe with the U-shaped cross-sectional cantilever and the cleaved highly oriented pyrolytic graphite (HOPG) before and after rubbing. As can be seen, after rubbing, the adhesion force substantially decreases from 250 nN to 31 nN. The decreasing trend is consistent with the literature [S13]. Meanwhile, the corresponding COF decreases from 0.01 to 0.004.

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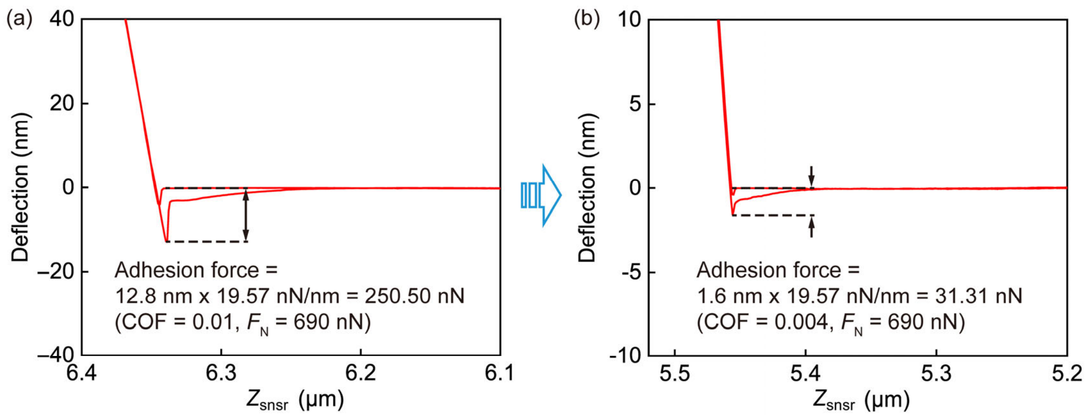

Fig. S1 Adhesion forces between the AFM probe with the U-shaped cross-sectional cantilever and the cleaved HOPG. (a) Before rubbing. (b) After rubbing.

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