

Controlling the nanoscale friction by layered ionic liquid films

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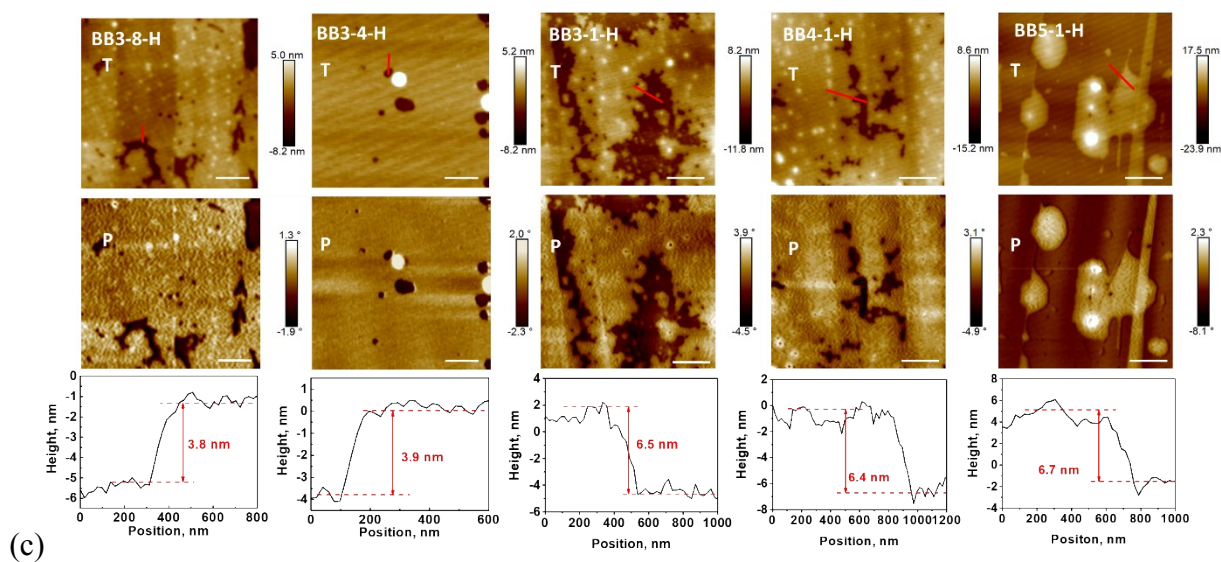
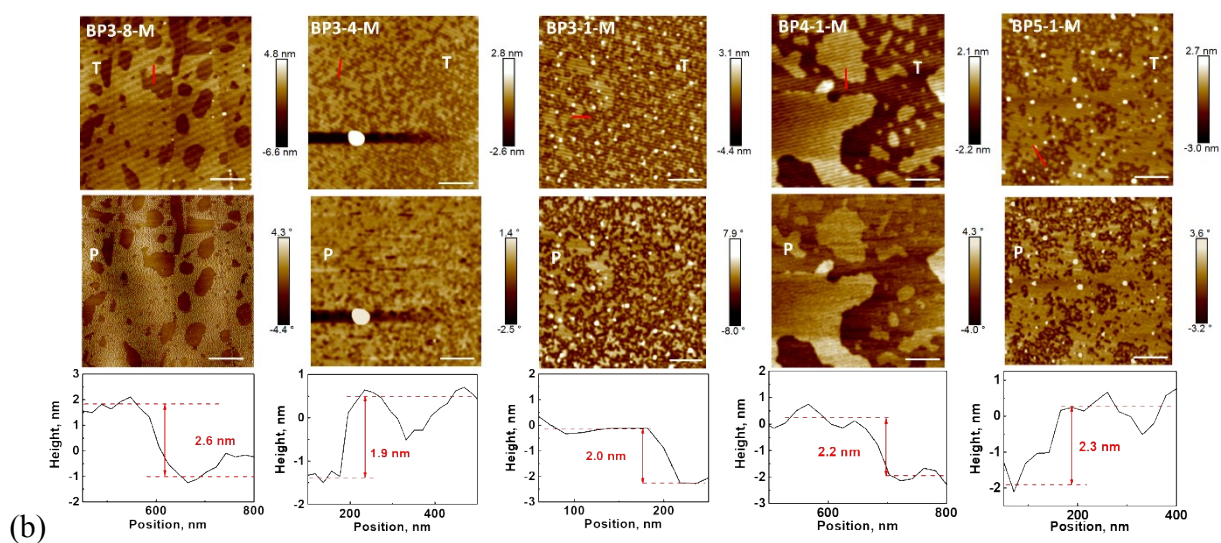
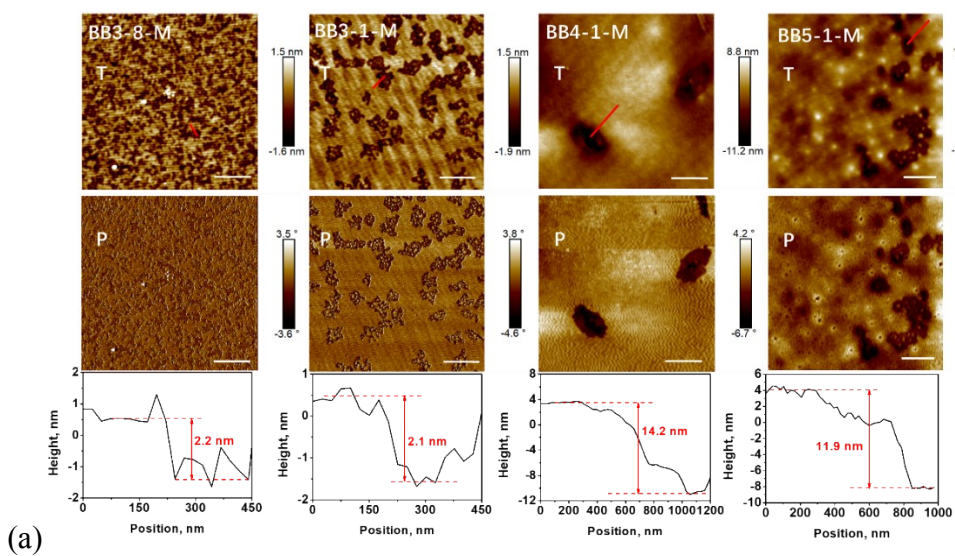
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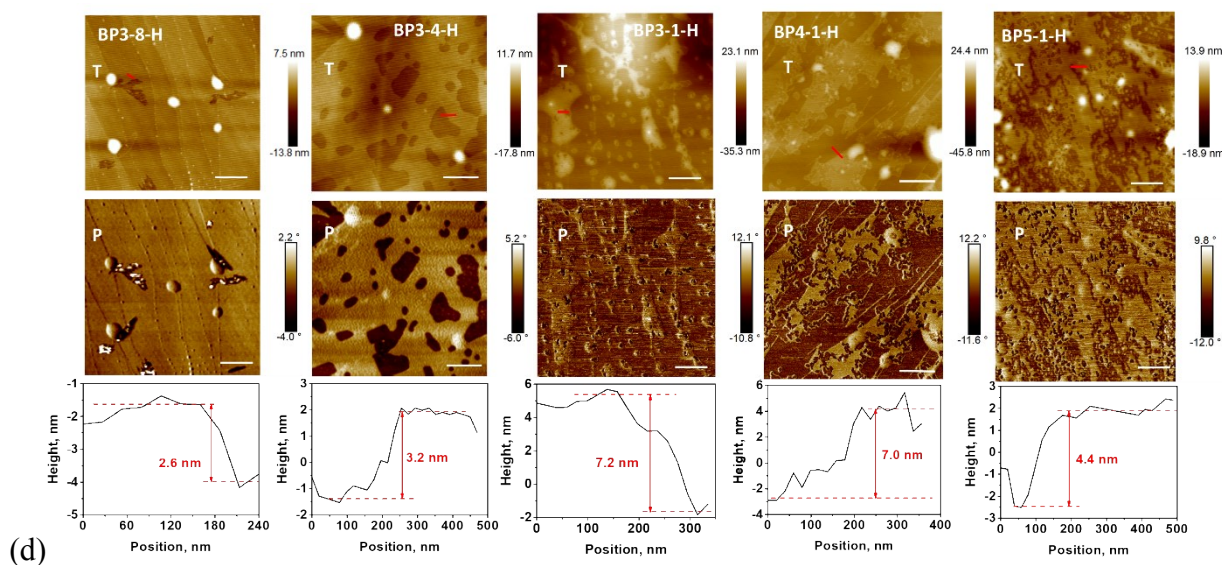


Fig. S1. AFM topographical (T) and phase (P) images of (a) BB and (b) BP coated mica, (c) BB and (d) BP coated HOPG surfaces, and corresponding cross-sectional profiles, scale bars = 1 μm . BB5-1-M means the IL film formed by using 10^{-5} mL [BMIM][BF₄] IL/mL ethanol (1 μL) on the mica surface. The detail of the abbreviations is given in Table 1.

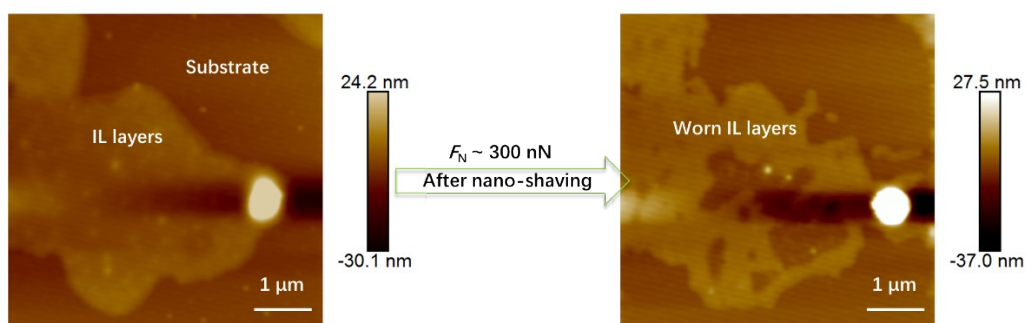


Fig. S2. Topographic images of BB3-4-M before and after nano-shaving with a normal force of ~ 300 nN (F_N).

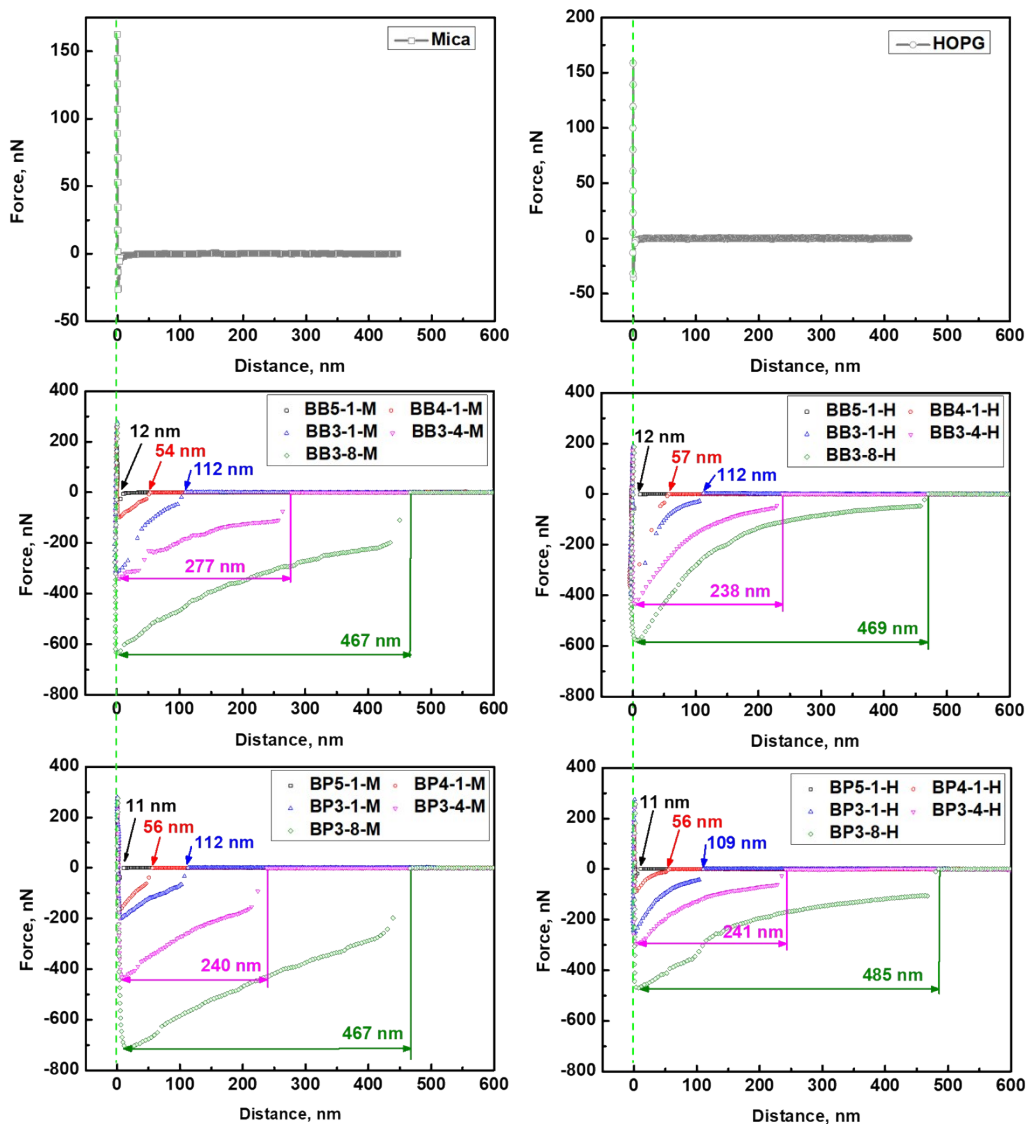


Fig. S3. Representative approaching force vs distance curves measured by glass colloidal probes on bare mica and HOPG surfaces, as well as ILs BB and BP coated HOPG and mica surfaces. BB = [BMIM][BF₄], BP = [BMIM][PF₆], H = HOPG, M = mica. BB5-1-M means the IL film formed by using 10⁻⁵ mL [BMIM][BF₄] IL/mL ethanol (1 μ L) on the mica surface. The detail of the abbreviations is given in Table 1.

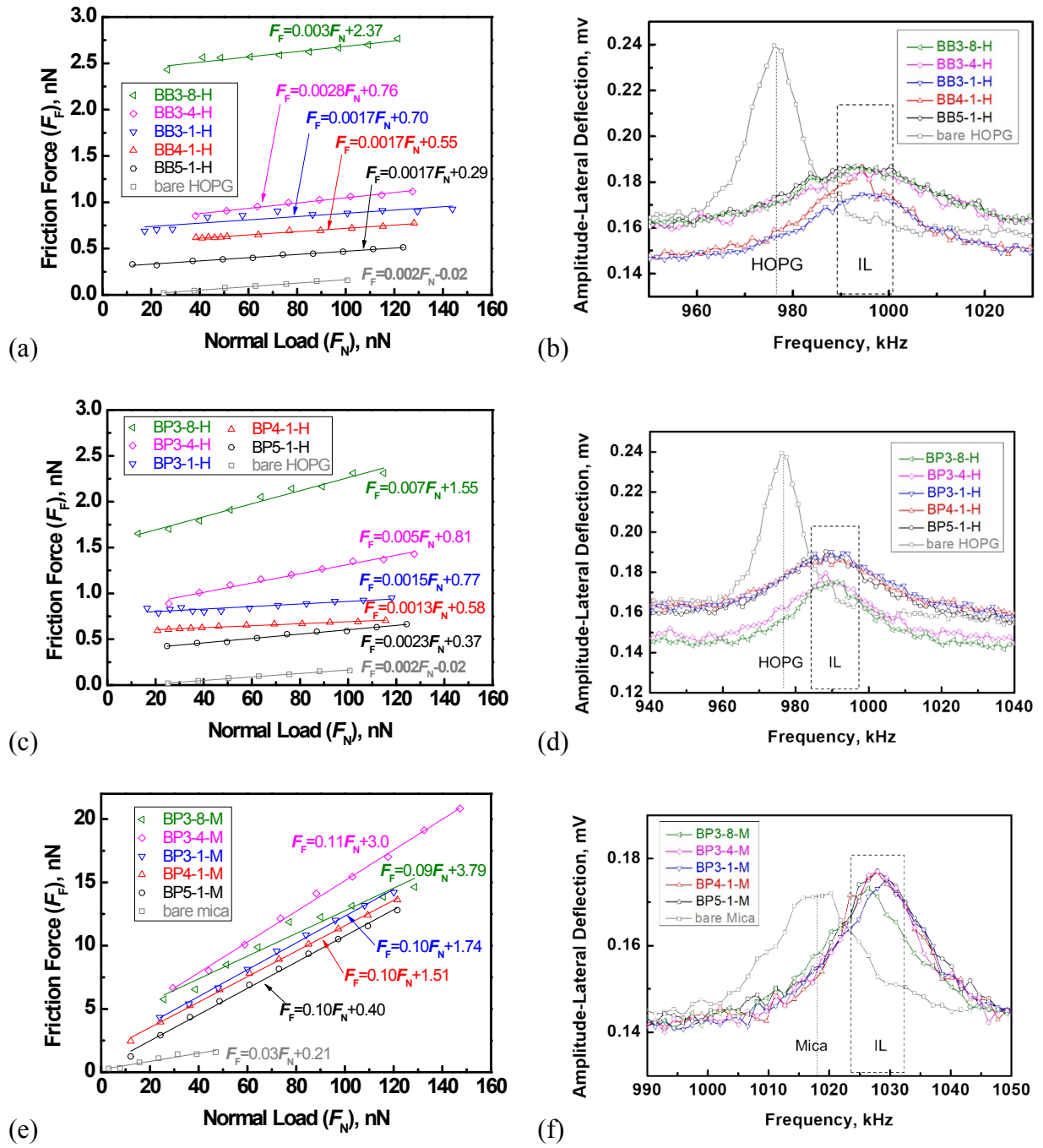
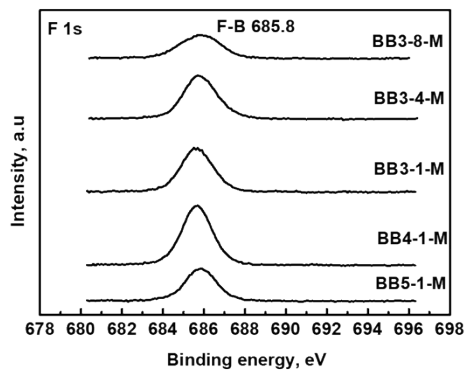
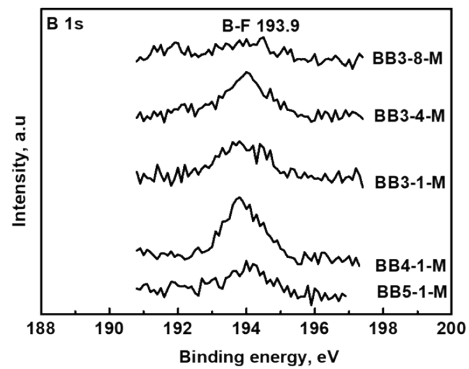
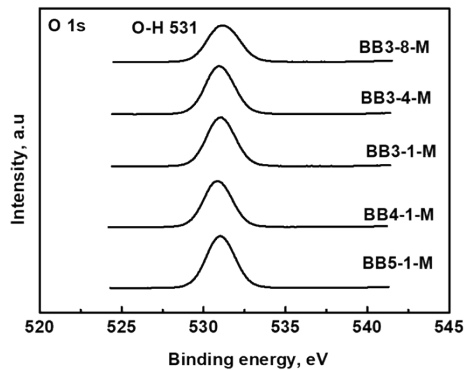
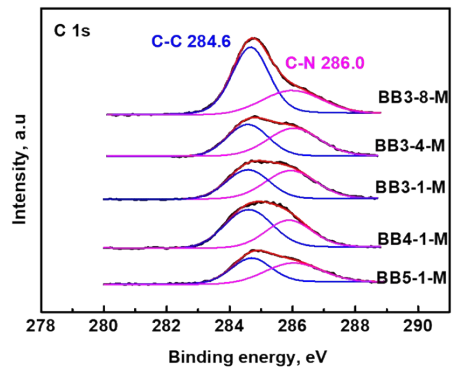
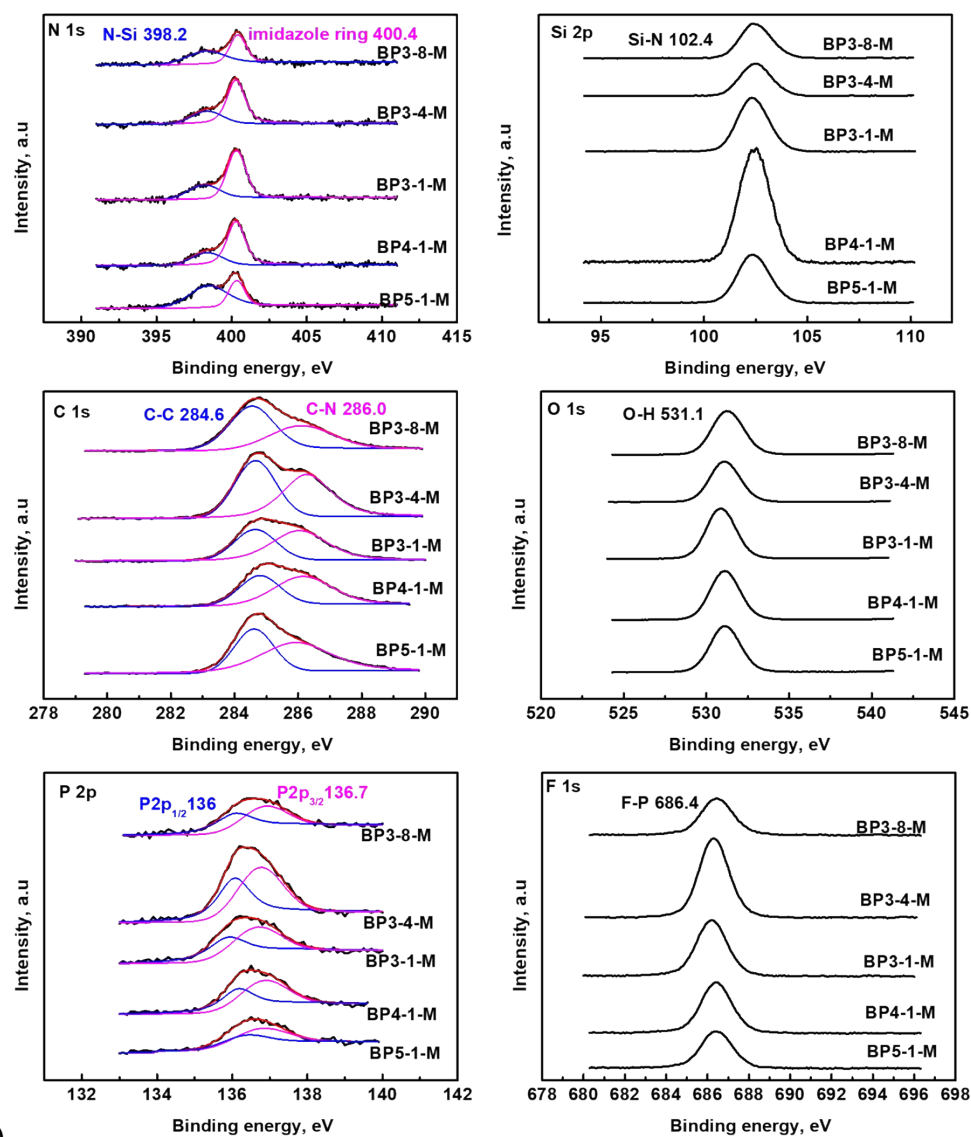


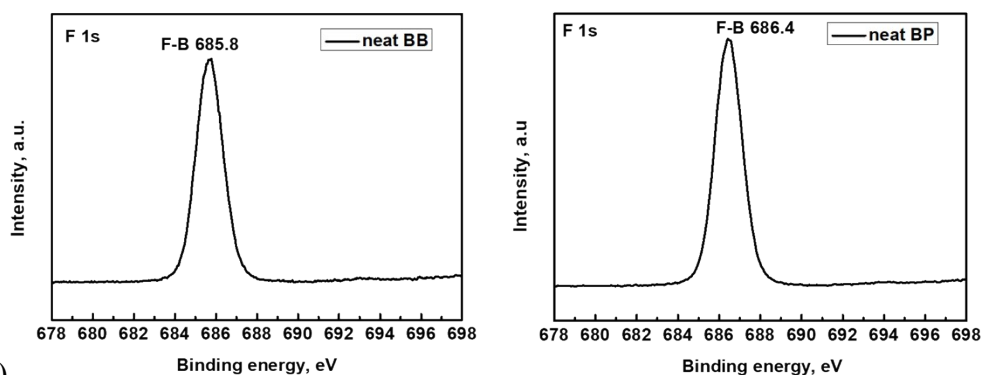
Fig. S4. (a), (c), (e) Typical friction force vs applied normal load regressions used to calculate the friction coefficient, and (b), (d), (f) torsional resonance spectra from the lateral force signal, measured by silicon nitride cantilevers, for BB, BP at mica and HOPG interfaces.



(a)



(b)



(c)

Fig. S5. High resolution XPS spectra of Si 2p, N 1s, C 1s, F 1s, O 1s, B 1s, P 2p at (a) BB-mica, (b) BP-mica interfaces, (c) F 1s spectra for neat BB and BP.

