

## SUPPORTING MATERIALS

- Figure S1.** Frictional force–sliding distance curves for various vertical distances (1.27 Å, 1.47 Å, 1.67 Å, 2.27 Å, and 2.67 Å) between the tip and SLMoS<sub>2</sub> film for sliding paths along the AC orientation (a–b, e–g, and k–m) and ZZ orientation (c–d, h–j, and n–p). The tip radii of 1 Å, 3 Å, and 7 Å are for a–d, e–j, and k–p, respectively. The curves in Figure S1 (a), (b), (c), (d), (f), (i), (m) and (p) are the overlap of multiple curves, and the displayed curves are the dark colored curve (such as purple curves for Figure S1 (a), (c), (m) and (p), and red curves for Figure S1 (b), (d), (f) and (i)), which are the same as that in Figure 3.



