Abstract Submitted
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Measuring nanoscale friction between 2D materials and SiO_2: hBN, MoS_2 and Phosphorene[1] JASON CHRISTOPHER, Boston University, STEVEN KOENIG, National University of Singapore, ANGELO ZILETTI, Boston University, BO WEN, ZHENG HAN, Columbia University, ALEX KITT, XUANYE WANG, LOGAN KAGEORGE, Boston University, CORY DEAN, Columbia University, BARBAROS OZYILMAZ, National University of Singapore, ANNA SWAN, BENNETT GOLDBERG, Boston University — Unlike their 3D counterparts, 2D materials can be tuned with strain, leading to "strain engineering" of electrical, optical and thermal properties. Control of the precise location, magnitude and direction of a strain field depends critically on characterizing and understanding any motion or sliding between the 2D material and its anchor points. With this goal in mind, we determine the friction between three different atomically thin materials and a SiO_2 substrate. Our experimental setup consists of cylindrical, micro-chambers we etch into a SiO_2 substrate and seal with a 2D material membrane. We pressurize the outside of the micro-chamber, causing the 2D material to deform and slide on the substrate. The resulting strain distribution and amount of sliding is mapped using high spatial resolution Raman spectroscopy from which we determine the friction, Grüneisen and shear deformation potentials. MoS_2, hBN, and Phosphorene have been chosen because they are good candidates for strain engineering applications. Additionaly, in the case of MoS_2 and Phosphorene we measure the photoluminescence spectrum from which we determine the strain dependence of the band gap.

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