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**Nanoscale friction for strain engineering: a case study of $MoS_2$**
JASON CHRISTOPHER, ALEXANDER KITT, XUANYE WANG, ANNA SWAN, BENNETT GOLDBERG, Boston University — 2D materials are superior to 3D materials in their ability to withstand large deformations without failure and so large strains can be applied to engineer electrical and optical properties. To control precisely the location, magnitude and direction of a strain field it is critical to understand the friction between the 2D layer and supporting substrate since sliding alters the strain distribution. Here we use $MoS_2$ covered microchambers strain tuned by applying a variable external pressure that deflects the suspended membrane creating strain in both the suspended and supported regions. This allows us to determine the friction between mono, bi and tri layer $MoS_2$ and $SiO_2$ as well as discern the strain dependence of the band-gap and Grüneissen parameters of $MoS_2$. The friction between $MoS_2$ and $SiO_2$ is compared with the friction between graphene and $SiO_2$. These results are essential for strain engineering applications of $MoS_2$ and to all 2D materials by establishing this method for measuring friction.

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