Science Advances

AAAS

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Supplementary Materials for

K-Λ crossover transition in the conduction band of monolayer MoS_2 under hydrostatic pressure

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Published 3 November 2017, *Sci. Adv.* **3**, e1700162 (2017)
DOI: 10.1126/sciadv.1700162

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The pressure rate of the in-plane lattice constant of Si can be calculated to be about 1.02%/GPa according to its Young's Modulus (*45*). Assuming that the pressure rate of the in-plane lattice constant of monolayer MoS_2 to be about 0.24%/GPa, the same as that of bulk MoS_2 (*46*), we can conclude that the extra strain in plane should be compressive strain. So it is possible to induce an additional compressive strain to monolayer MoS_2 by Si/SiO_2 substrate.

In order to investigate this, we measured the Raman spectra of monolayer MoS_2 under various pressures and plotted them in the following figures:

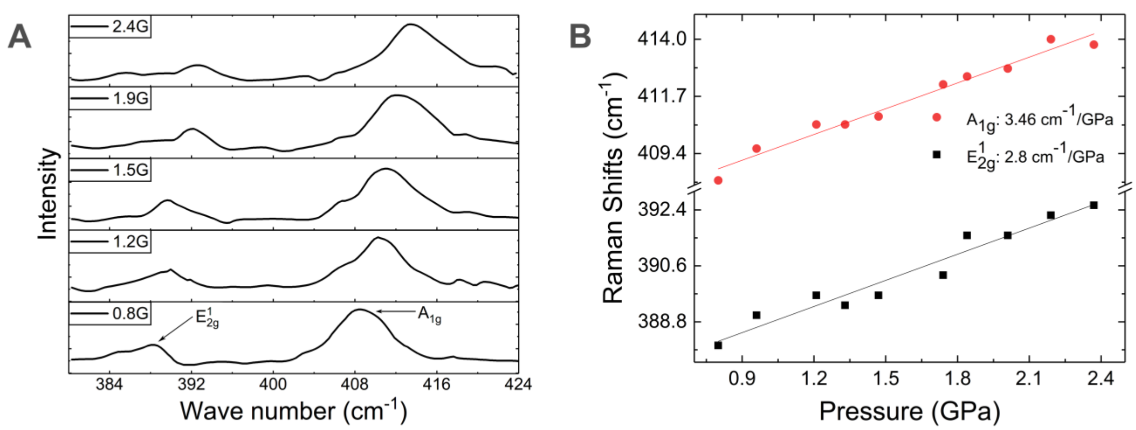

fig. S1. Raman spectra of monolayer MoS_2 under various pressures. (**A**) Raman spectra of monolayer MoS_2 under 0.8 GPa, 1.2 GPa, 1.5 GPa, 1.9 GPa, 2.4 GPa. (**B**) Raman shifts of monolayer MoS_2 versus pressure. With pressure increasing, the in-plane mode of E_{2g}^{1} and out-of-plane mode of A_{1g} blueshift at a rate of 2.8 cm^{-1}/GPa and 3.46 cm^{-1}/GPa, respectively.

We can see that, along with increasing the pressure, the in-plane mode of E_{2g}^{1} is slightly smaller than that of the out-of-plane mode of A_{1g}. Thus the additional compressive strain induced by Si/SiO_2 substrate can be neglected. We think that herein the 300 nm amorphous SiO_2, which has the van der Waals interaction with the monolayer MoS_2, plays a buffer layer role that releases the strain transmitted from the Si substrate.