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Raman spectroscopy measurement of MoS_2 to 43 GPa[1]
YANZHANG MA, Texas Tech University, BOHENG MA, Thomas S. Wootton High School, HONGYANG ZHU, MING CHYU, Texas Tech University — MoS_2 has a typical layered crystal structure. The two-dimensional lattice vibration, in conjunction with the strong (ionic) and weak (Van de Waals) bonding, is a very interesting subject. Among many of the interesting properties of MoS_2 is the physical performance in response to the substantial reduction of distance between the layers of the MoS_2 network along with the increase of interaction between them. We compressed MoS_2 in a diamond anvil cell to 43 GPa and carried out *in situ* Raman spectroscopy measurement. We found that the vibration energy of the $A^1_{1g}$and E^1_{2g}modes was elevated with increasing pressure. At about 27 GPa, the peak of E^1_{2g} mode split into two peaks while the A^1_{1g} peak did not show any abnormality. We believe that this reflects a structural phase transformation due to a minimal distortion of the MoS_2 network within the layer. We also found that non-hydrostatic compression on the sample lowered the pressure-induced energy elevation of the vibration modes, indicating that the differential stress applied on a MoS_2 crystal resists the atomic vibration.

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Yanzhang Ma
Texas Tech University

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