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Strain engineered phonon and band gap modification in 2D materials

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Atomically thin materials have attracted widespread research interest due to their remarkable variety of important physical and chemical properties. Strain, which can be used to significantly tune the properties of these two-dimensional (2D) materials, thus allows for the investigation of their novel fundamental physics and applications. This talk presents the phonon and electronic structure engineering of 2D MS2 (M=Mo, W) and Black Phosphorous (BP) crystals via uniaxial strain through a combination of *in situ* Raman and photoluminescence spectroscopy studies, as well as density functional theory calculations. We have demonstrated the sensitivity of light emission and crystal orientation determination in strained MS2 and anisotropic phonon response to uniaxial strain in BP. This study improves our understanding of strained states of semiconducting layered materials and further lays a solid foundation for developing various applications based on such emerging 2D materials, especially the ones related to wearable and flexible optoelectronic devices.

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