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Coupling between shear and tensile strains in layered two-dimensional crystals SUNGJONG WOO, YOUNG-WOO SON, Korea Institute for Advanced Study — We report a theoretical study revealing unavoidable coupling between shear and tensile strains in several layered two-dimensional crystals. It is shown that the coupling can explain a recent Raman experiment exhibiting an anomalous splitting in the low frequency interlayer shear modes of bilayer MoS_2 under uniaxial strain. We have found that the splitting comes from the strain-induced interlayer sliding. Our calculation shows that the direction of the induced sliding is related to the strain-induced polarization, piezoelectricity, that is calculated using electronic Berry phase, thus connecting piezoelectricity of a layered material with its elastic effect. We will present the results of our calculations for shear-tensile strain coupling of graphene, h-BN, and MoS_2 respectively and demonstrate that the Raman measurement can determine the off-diagonal elements of compliance tensor of the layered materials.

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