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Second harmonic generation from few-layer MoS2 and BN YILEI LI, YI RAO, KIN FAI MAK, YUMENG YOU, SHUYUAN WANG, TONY HEINZ, Columbia University — We have measured optical second harmonic generation (SHG) from few-layer MoS2 and hexagon BN samples. In both materials, we observe SHG for odd numbers of layers. However, no appreciable SHG signal is observed for samples with even numbers of layers. This general behavior is compatible with the fact that individual layers of each material are non-centrosymmetric, thus allow SHG in the dipole approximation. For even layer thickness, on the other hand, the overall structures become centrosymmetric, with adjacent layers producing canceling contributions. In the case of odd layer thickness, we observe strong in-plane variation of the SHG signal with polarization. From this dependence, we can determine crystallographic axes in the material by a purely optical measurement. We also discuss the evolution of the signal strength in the two material systems with thickness (for odd layer numbers), considering both propagation effects and the evolution of the electronic structure of the material with thickness [1].

[1] Kin Fai Mak, Changgu Lee, James Hone, Jie Shan and Tony F. Heinz, Phys. Rev. Lett, **105**, 136805, 2010

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