**Polarization dependent optical response and layer-controlled band gap of group IV monochalcogenides**

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Sharing with the same bulk-like flake crystal structure of black phosphorus and phosphorene, group IV monochalcogenides exhibits unique many-electron effects in its electronic and optical properties. Few-layer group IV monochalcogenides absorbs light polarized along the structures’ armchair direction and is transparent to light polarized along the zigzag direction, making them potentially viable linear polarized for applications [1]. In this work, we employ first-principles excitation calculations based on the combined GW+BSE approach to explore the electronic structure and optical response with respect to different polarizations of few-layer layered group IV monochalcogenides. In addition to the strong polarization dependence of the optical absorption spectra, the band gap, excitation binding energies, and optical absorption spectrum of group IV monochalcogenides can also be broadly tuned by changing the number of stacked layers. This scenario serves as a convenient and efficient method for engineering the layered material’s excited-state properties.

1. Hung-Chung Hsueh, Jia-Xuan Li, and Ching-Hwa Ho, Adv. Optical Mater. **6**, 1701194 (2018).