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2D Germanium Selenide for Photovoltaics and Optoelectronics

Abstract: 2D germanium selenide including GeSe and GeSe₂ has attracted significant attention recently due to its intriguing in-plane anisotropic properties originated from the low-symmetry crystal structure, as well as earth-abundant and low-toxic constituents.^[1-3] As for GeSe, we reported the first GeSe thin-film solar cell with an efficiency of 1.48%,^[1] and systematically investigated the basic physical properties of GeSe films including refractive index, dielectric constant, carrier mobility, lifetime, and diffusion length,^[2] providing a solid foundation for the further development of GeSe solar cells. With regard to GeSe₂, we studied the in-plane anisotropic structural, vibrational, electrical, and optical properties from theory to experiment. Photodetectors based on GeSe₂ exhibit a highly polarization-sensitive photoresponse in short wave region due to the optical absorption anisotropy induced by in-plane anisotropy in crystal structure.^[3]

References

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Figures

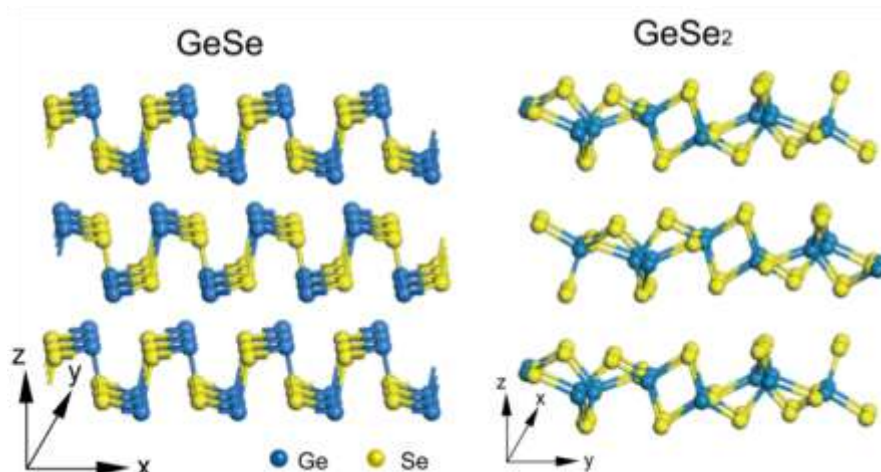


Figure 1: 2D crystallographic structure of GeSe and GeSe₂