

Supplementary information

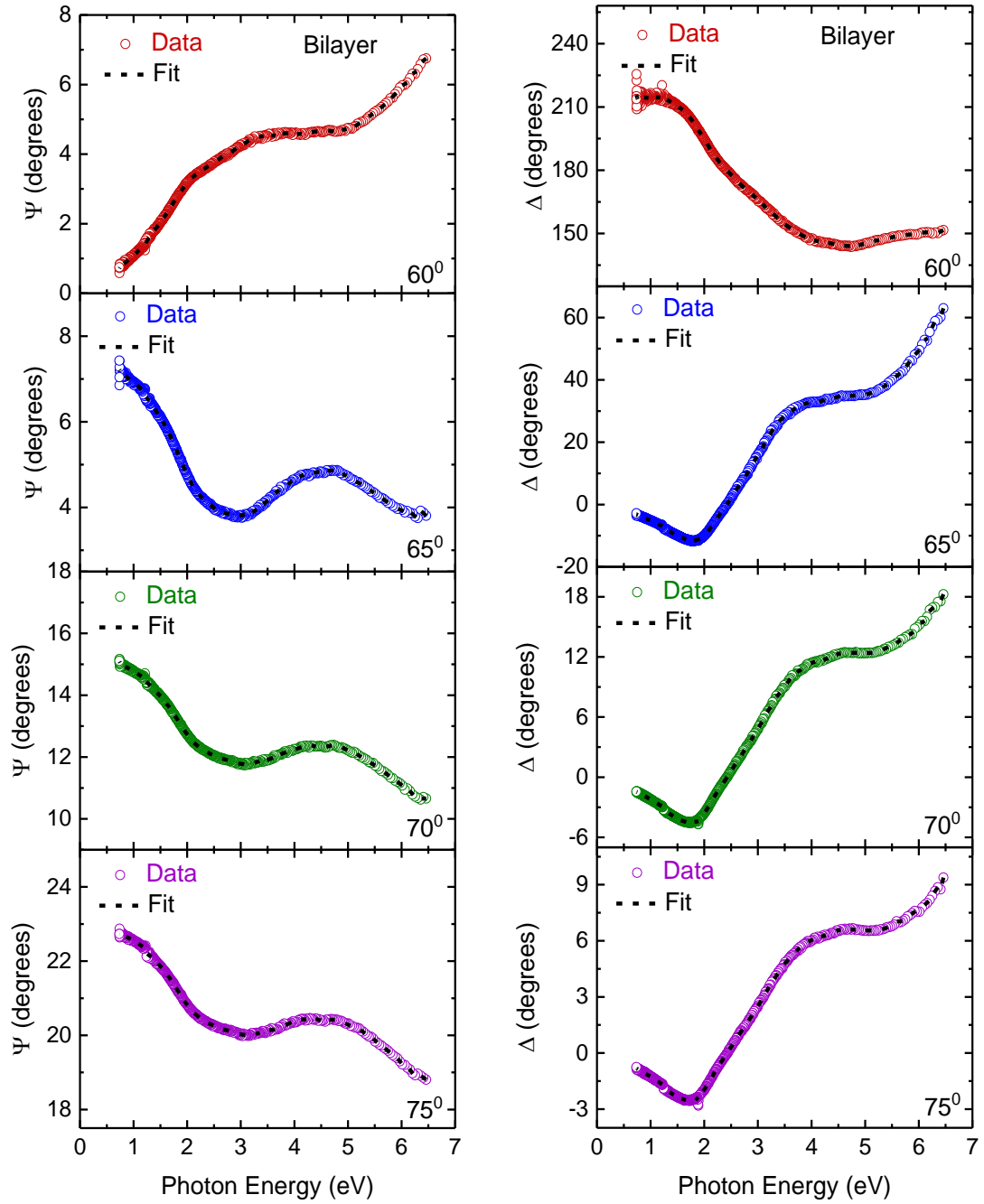
Temperature-dependent optical and vibrational properties of PtSe₂ thin films

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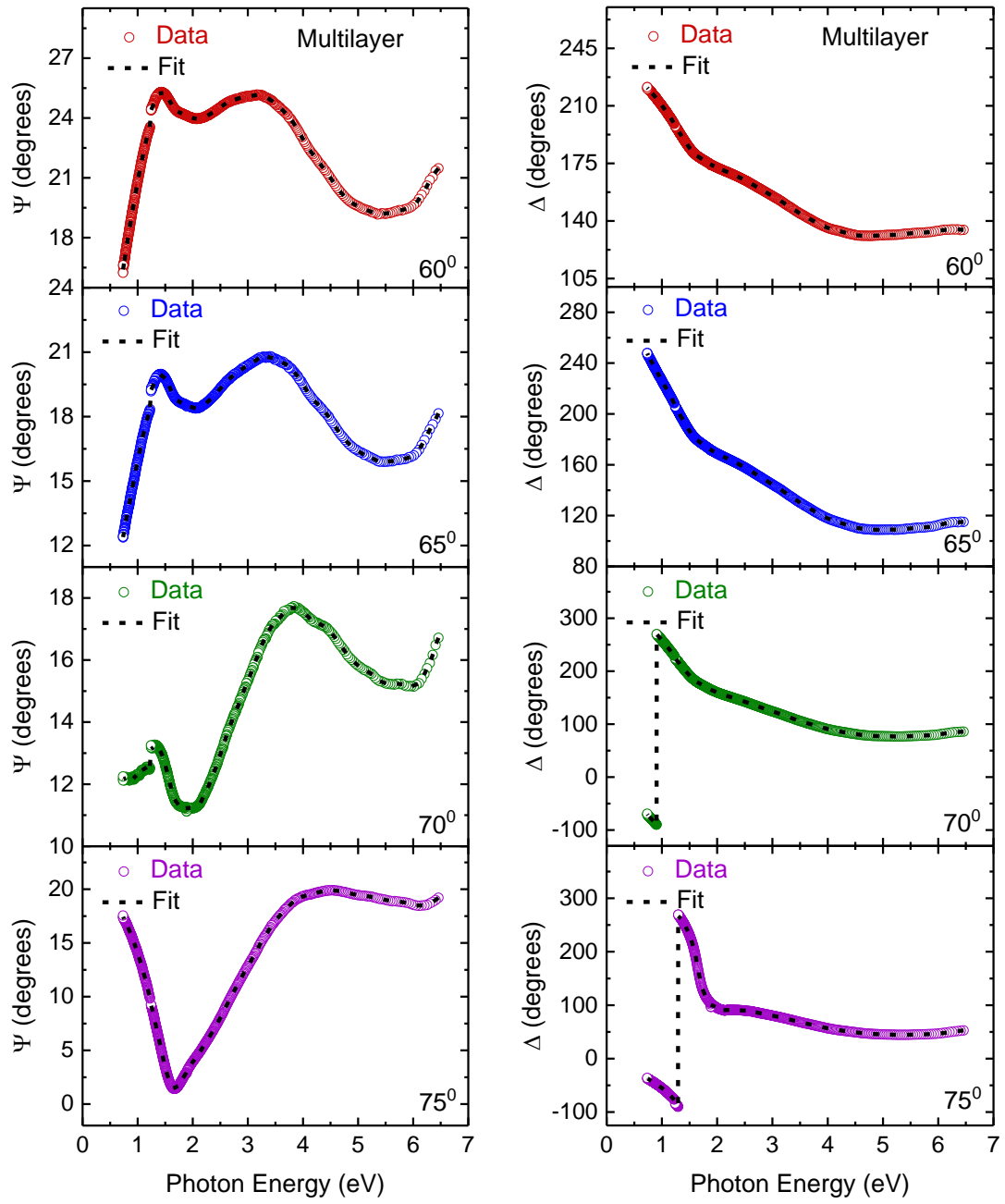
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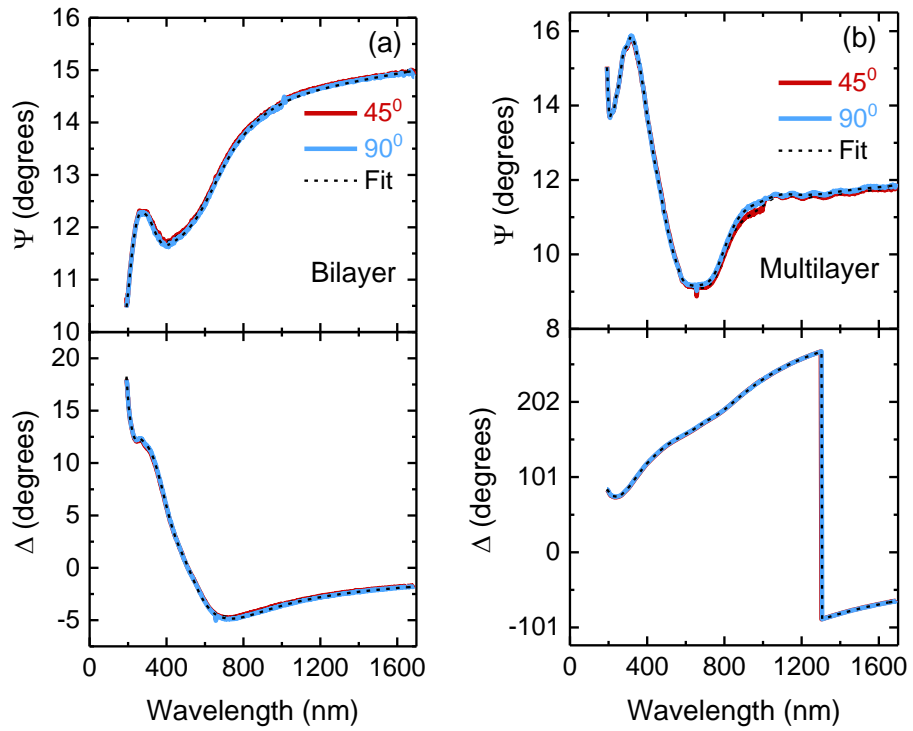
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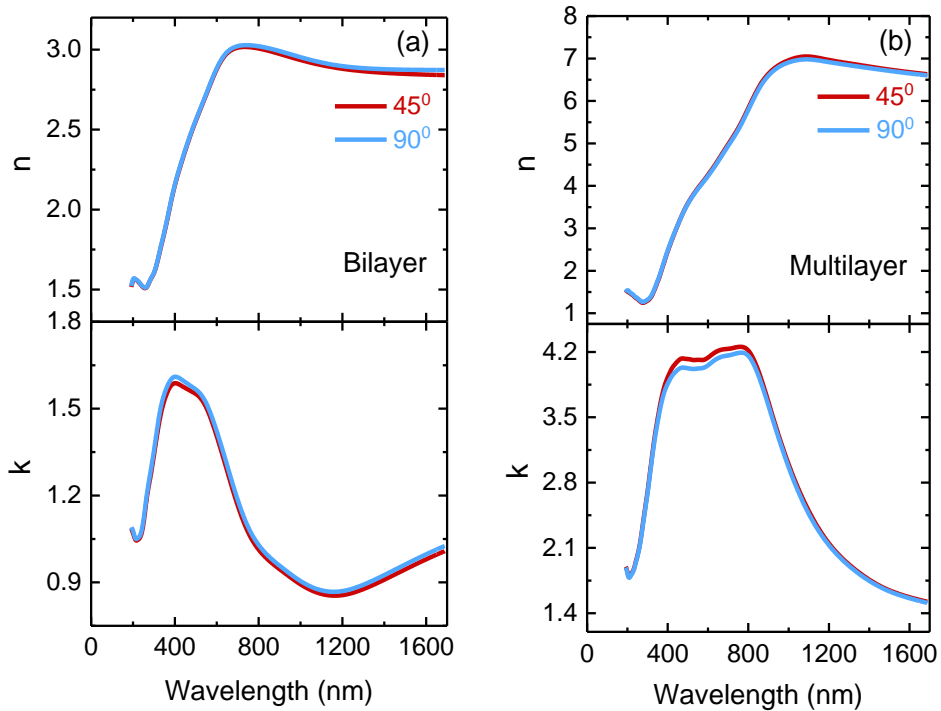
Supplementary Fig. 1. Room temperature experimental at 60°, 65°, 70°, and 75° incidence angles and fitting model of ellipsometric parameters of psi (Ψ) and delta (Δ) of bilayer PtSe₂ thin film.



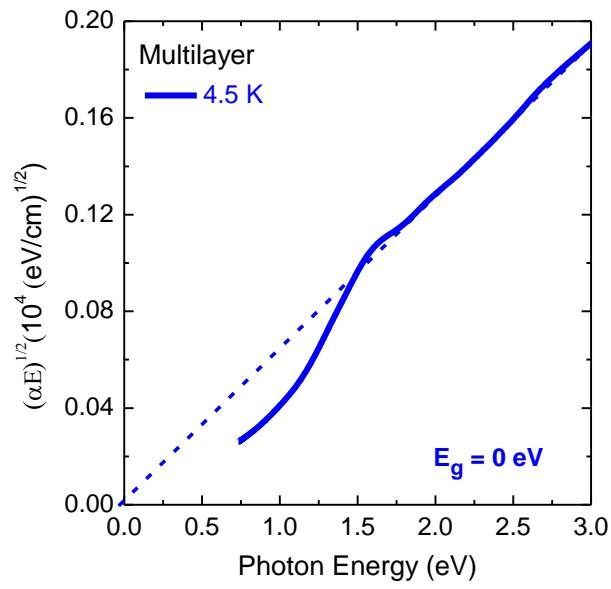
Supplementary Fig. 2. Room temperature experimental at 60°, 65°, 70°, and 75° incidence angles and fitting model of ellipsometric parameters of psi (Ψ) and delta (Δ) of multilayer PtSe₂ thin film.



Supplementary Fig. 3. Room temperature experimental at 70° incidence angle and fitting model of ellipsometric parameters of psi (Ψ) and delta (Δ) of (a) bilayer and (b) multilayer PtSe₂ thin films.



Supplementary Fig. 4. Room temperature refractive index and extinction coefficient of (a) bilayer and (b) multilayer PtSe₂ thin films by rotating the sample's azimuthal orientation of 45 and 90 degrees.



Supplementary Fig. 5. The plot of $(\alpha \cdot E)^{1/2}$ vs. photon energy enables the extraction of indirect band gap of multilayer PtSe₂ thin films at 4.5 K.