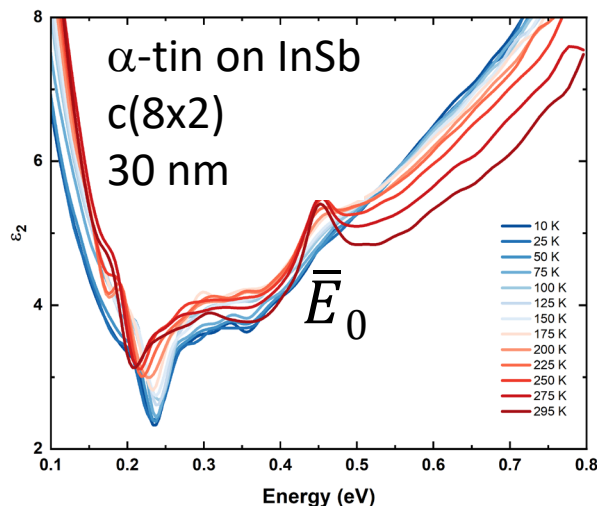
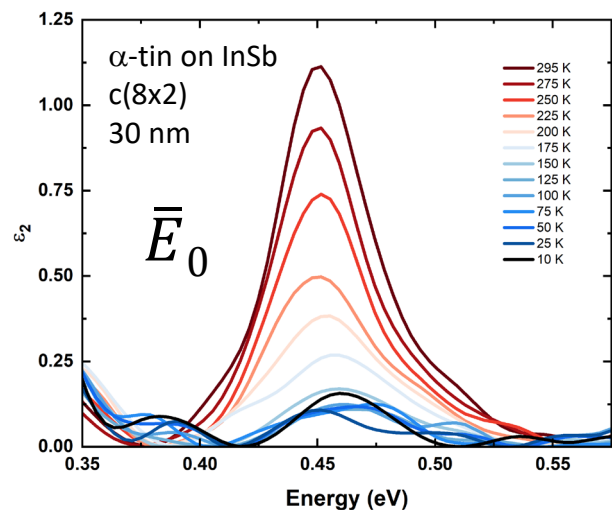
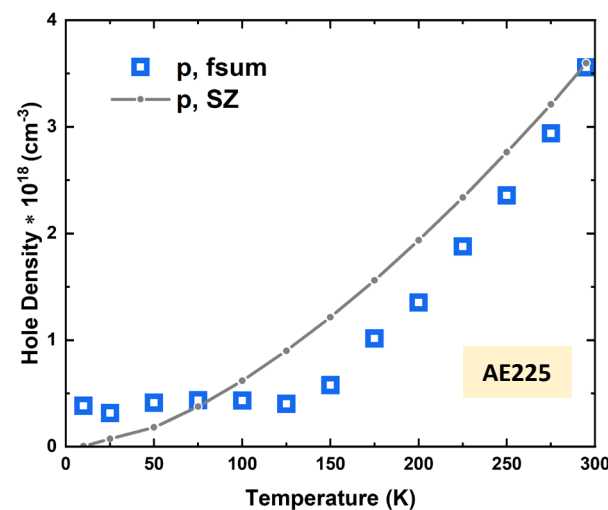


Jaden R. Love (MAP graduate student)

S. Zollner, B. Kiefer, I. Vasiliev, M. Zhou, L. Miao, New Mexico State University

 ϵ_2 from 300 K – 10 K $\bar{E}_0$ with linear background subtraction

Hole Density vs. Temperature

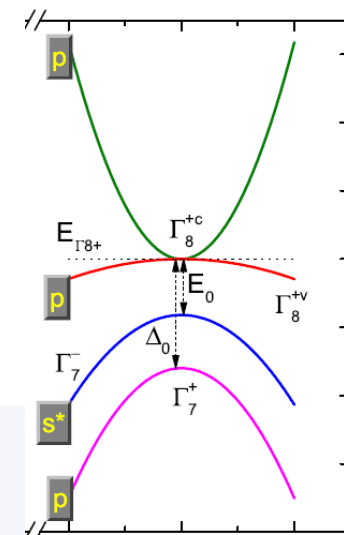


→ Ellipsometric angles modeled using basis spline functions for temperatures 300 K – 10 K to obtain the dielectric function for α-tin on InSb.

→ The f-sum rule is applied to the $\bar{E}_0$ absorption peak to determine the heavy hole density as a function of temperature.

$$\int_0^{\infty} \omega \epsilon_2(\omega) d\omega = \frac{\pi}{2} \omega_P^2$$

- f-sum rule: calculate carrier concentration from integrated absorption (oscillator strength).
- Direct gap absorption for 30 nm α-Sn on InSb (100) c(8x2) constant up to 150 K due to transitions into the light “hole” conduction band.
- Direct gap absorption increases above 150 K due to thermal excitation of heavy holes.
- Good agreement with theory for heavy hole mass $m_{hh}=0.26$. (Zollner, JVSTB, 2025.)



α-tin on InSb grown by A. Engel and C. Palmstrom

