

Supplementary information

XPS measurements:

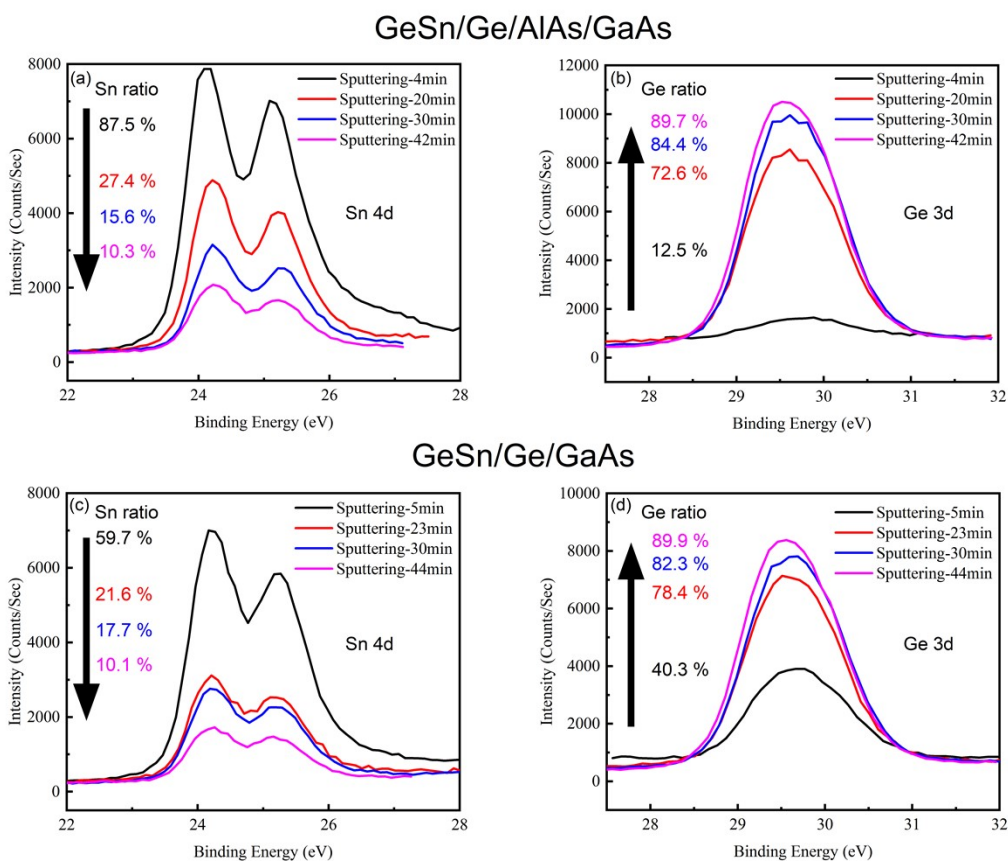


Figure S1: Sn 4d and Ge 3d binding energy peaks of GeSn/Ge/AlAs/GaAs in panels (a) and (b), and GeSn/Ge/GaAs in panels (c) and (d) after different sputtering times. The ratios in the plots display the concentrations of Ge and Sn after different times of Ar ion sputtering, and the arrow shows the change in the concentration throughout etching.

XRD out-of-plane relationships:

The out-of-plane lattice parameter is represented by a_{\perp} while ε_z represents the out-of-plane strain.

$$Q_z = \frac{2\pi l}{a_{\perp}} \quad (S1)$$

$$\varepsilon_z = \frac{a_{\perp} - a_0}{a_0} \quad (S2)$$