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Pseudomorphic growth of $Ge_{1-y}Sn_y$ (y = 0.06 - 0.17) films and devices on Ge/Si(100) *via* chemical precursors PATRICK WALLACE, CHARUTHA SENARATNE, CHI XU, PATRICK SIMS, JOHN KOUVETAKIS, JOSE MENENDEZ, Arizona State University — Epitaxial films of $Ge_{1-y}Sn_y$ have been grown pseudomorphically on Ge-buffered Si(100) using gas-source molecular epitaxy. Ultra-low temperatures (150-200 C) and low pressures in conjunction with specialized precursors such as Ge_4H_{10} and SnD_4 resulted in films with compositions (y = 0.06-0.17). Thorough characterization illustrates that the thin films possess excellent crystal quality and low defectivites with thicknesses 39-370 nm; these thicknesses match or exceed those previously reported for pseudomorphic films attained *via* traditional growth methods. The introduction of $P(GeH_3)_3$ during growth was used to achieve *in situ* *n*-type doping, SIMS analysis indicates uniform distributions of carriers with concentrations up to 1.7×10^{19} cm^{-3}. Prototype GeSn *pn* diodes were fabricated and demonstrate the typical tunneling diode IV characteristics associated with this type of device structure. In contrast to typical MBE methods, pseudomorphic growth using this technique allows for scale-up and *in situ* doping as needed for commercial realization.

Patrick Wallace
Arizona State University

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