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**Strain dependence of the band structure and critical points of pseudomorphic $Ge_{1-y}Sn_y$ alloys on Ge** NALIN FERNANDO, JAIME MOYA, STEFAN ZOLLNER, New Mexico State University, JOHN HART, DAINAN ZHANG, RYAN HICKEY, RAMSEY HAZBUN, JAMES KOLODZEY, University of Delaware — The energy band structure of Ge is a strong function of strain, and a transition from an indirect to a direct band gap has been observed for y ˜6-10% for $Ge_{1-y}Sn_y$ indicating the possibility of widespread applications of Ge-based photonic devices. Hence it is important to study the composition and strain dependence of the $Ge_{1-y}Sn_y$ alloy band structure through measurements of the optical properties. The complex pseudodielectric functions of pseudomorphic $Ge_{1-y}Sn_y$ alloys grown on Ge by MBE were measured using spectroscopic ellipsometry and FTIR ellipsometry in the 0.1-6.6 eV energy range for Sn contents up to 10%, to investigate the compositional dependence of the direct band gap $E_0$, $E_1$ and $E_1 + \Delta_1$ critical point (CP) energies. CP energies and related parameters were obtained by analyzing the second-derivative of the dielectric function. Our experimental results are in good agreement with the theoretically predicted CP energies of $Ge_{1-y}Sn_y$ on Ge based on deformation potential theory. We will present the nature of the band gap of pseudomorphic $Ge_{1-y}Sn_y$ on Ge and the effects of strain that control the indirect to direct band gap transition.

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