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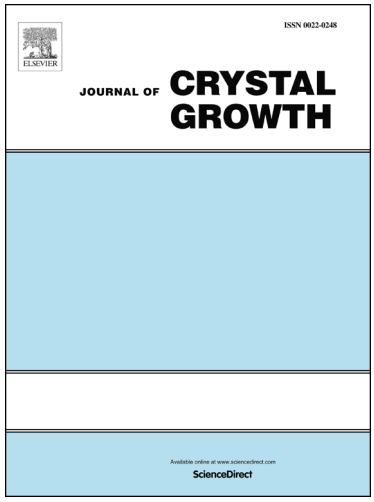

Impact of thickness on the structural properties of high tin content GeSn layers

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ACCEPTED MANUSCRIPT

Impact of thickness on the structural properties of high tin content GeSn layers

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Abstract:

We have grown various thicknesses of GeSn layers in a 200 mm industrial Reduced Pressure - Chemical Vapor Deposition cluster tool using digermane (Ge_2H_6) and tin tetrachloride ($SnCl_4$). The growth pressure (100 Torr) and the $F(Ge_2H_6)/F(SnCl_4)$ mass-flow ratio were kept constant, and incorporation of tin in the range of 10% - 15% was achieved with a reduction in temperature: 325°C for 10% to 301°C for 15% of Sn. The layers were grown on 2.5 µm thick Ge Strain Relaxed Buffers, themselves on Si(001) substrates. We used X-Ray Diffraction, Atomic Force Microscopy, Raman spectroscopy and Scanning Electron Microscopy to measure the Sn concentration, the strain state, the surface morphology and thickness as a function of growth duration. A dramatic degradation of the film was seen when the Sn concentration and layer thickness were too high resulting in rough/milky surfaces and significant Sn segregation.

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