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Surface Reconstructions and Bi Incorporation in GaAs1-xBix Alloys R.B. LEWIS, M. MASNADI, D.A. BEATON, University of British Columbia, T. TIEDJE, University of Victoria, X. LU, Arizona State University — Incorporation of Bi into GaAs allows for a large reduction of the GaAs bandgap per percent incorporation (7x greater than In, with modest increase in lattice size) and shows strong electro- and photoluminescence (PL). This will allow for longer wavelength devices to be grown on GaAs substrates, than is currently possible with pseudomorphic InGaAs on GaAs. GaAsBi growth is challenging as Bi has a strong tendency to surface segregate. Careful control of growth parameters, especially the As:Ga flux ratio is required, as Bi only incorporates when this ratio is close to unity. The low As:Ga flux ratio also makes Ga droplet formation a problem. Reflection high-energy electron diffraction (RHEED) is used as a crucial tool in locating the optimum growth conditions. As the As:Ga ratio is lowered to between 2 and 1 the RHEED pattern shifts from a 1x3 to a 2x1 reconstruction([1-10]x[110]), which corresponds to a surprising abrupt increase in bismuth incorporation. RHEED phase maps will be presented along with PL spectra and high-resolution x-ray diffraction rocking curves of grown samples.

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