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Surface Structure of Bi-terminated GaAs Grown with Molecular Beam Epitaxy ADAM DUZIK, JOANNA MILLUNCHICK, University of Michigan — Control of III-V semiconductor surfaces is crucial for high-quality device production. A means of interface control involves the use of Bi as a surfactant, which both smooths the surface and alters the surface reconstruction. We examined the effects of Bi deposition via molecular beam epitaxy on the GaAs(001) surface structure using reflective high energy electron diffraction and scanning tunneling microscopy. After ∼0.2 ML of Bi deposition, scanning tunneling microscopy revealed a disruption in the initial c(4×4) reconstruction. Coverages of ∼0.4 ML and ∼0.6 ML produced a (1×3) and a (2x3) diffraction pattern, respectively, and an atomic surface structure consisting of a disordered row reconstruction, $\beta 2(2\times4)$ reconstruction rows, and surface clusters, with 1 ML deep pits at a coverage of ∼0.6 ML. Calculations show these changes in surface structure and morphology are likely not the result of As desorption, but due to the presence of Bi on the surface. These observations may help explain the origin of Bi clusters that give GaAsBi most of its unique properties.

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