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Effects of As_4 flux on morphology of InGaAs quantum dots and the critical thickness N. LAMBERT, E. ADDISON EVERETT, DONG JUN KIM, HAEYEON YANG, Utah State University — We present a comprehensive in-situ scanning tunneling microscopy (STM) study of InGaAs quantum dots (QDs) on GaAs (001) substrates as a function of arsenic flux using molecular beam epitaxy (MBE). At 500°C and with all other MBE growth parameters fixed, changes in arsenic flux result in changes in the morphology of InGaAs QDs. Increasing arsenic flux results in decreasing numbers of InGaAs QDs. Reflection high energy electron diffraction patterns taken before the InGaAs deposition show that the surface reconstruction changes as a function of arsenic flux. The arsenic fluxes were kept the same during the subsequent $In_{.4}Ga_{.6}As$ deposition. After the deposition, the MBE grown samples were cooled down to room temperature by turning the growth stage heater off. The samples were then taken into the STM chamber via ultra-high vacuum port. STM images of InGaAs deposition show no dots with high As4 flux, and very high density of dots with low As4 flux. Effects of arsenic flux on the changes in surface reconstruction surface morphology and density of QDs, and the critical thickness to form the self-assembled QDs will be discussed.

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