Indium nitride growth on Si(100) by femtosecond pulsed laser deposition

MOHAMED HAFEZ, HANI ELSAYED-ALI, Old Dominion University — Deposition of indium nitride (InN) on Si(100) is performed under ultrahigh vacuum with an amplified Ti:sapphire laser (130 fs) operating at a wavelength of 800 nm. The objective is to grow single crystal InN films on Si(100). An intermediate layer of indium on Si(100)-(2×1) is prepared to avoid surface nitridation and decrease the lattice mismatch between the InN and Si(100). Reflection high-energy electron diffraction (RHEED) is used in situ during the deposition to study the growth dynamics and the surface structure of the grown films. Growth of indium on Si(100)-(2×1) by femtosecond pulsed laser deposition showed high-quality 2D films. The initial 2D indium layers on Si(100)-(2×1) formed in the In-(2×1) structure at room temperature and the In-(4×3) structure at a substrate temperature of 653-693 K. Growth of InN on the In-(2×1) and In-(4×3) buffer layer is discussed. The morphology of the InN films is examined by ex situ atomic force microscopy (AFM) and scanning electron microscopy (SEM).