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Effect of nitridation on the molecular beam epitaxy growth of GaN on ZrB_2(0001)/Si(111) YUKIKO YAMADA-TAKAMURA, JAIST and IMR, Tohoku Univ., Z.T. WANG, IoP, Chinese Academy of Science and IMR, Tohoku Univ., Y. FUJIKAWA, T. SAKURAI, IMR, Tohoku Univ., Q.K. XUE, IoP, Chinese Academy of Science, J. TOLLE, J. KOUVETAKIS, I.S.T. TSONG, Arizona State Univ. — ZrB_2 is a conductive, reflective, and lattice-matched buffer layer for GaN growth on Si. Here we report the effect of nitridation on the epitaxial growth of GaN on ZrB_2(0001) films prepared *ex situ* and *in situ*, which was studied using an ultrahigh vacuum molecular beam epitaxy - scanning probe microscopy (MBE-SPM) system. The growth of GaN was carried out by rf-plasma assisted MBE, and epitaxy of wurtzite GaN with N-polarity was observed on both *ex-situ* and *in-situ* prepared ZrB_2 films. The nitridation of ZrB_2 films were conducted by exposing them to active nitrogen, and well-ordered hexagonal boron nitride (h-BN) formation was observed when the annealing temperature was above 900^oC. The partially formed BN layer affected neither the epitaxy nor the polarity of GaN, but when the surface was fully covered with well-ordered h-BN, GaN growth did not occur. The high GaN nucleation selectivity observed between clean and h-BN covered ZrB_2 suggests the possibility of applying epitaxial lateral overgrowth method, which is known to be difficult in elemental source GaN MBE growth. Ref. Z. T. Wang *et al.,* J. Appl. Phys. 100, 033506 (2006).

Yukiko Yamada-Takamura
School of Materials Science, JAIST

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