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Surface and interface studies of GaN growth on ZrB_2(0001)/Si(111) YUKIKO YAMADA-TAKAMURA, Z. T. WANG, Y. FUJIKAWA, Q. K. XUE, T. SAKURAI, IMR, Tohoku University, J. TOLLE, P.-L. LIU, A. V. G. CHIZMESHYA, J. KOUVETAKIS, I. S. T. TSONG, Arizona State University — ZrB_2 is a conductive, reflective, and lattice-matched buffer layer for GaN growth on Si. This study demonstrates the inherent suitability of ZrB_2 as an ideal buffer layer for growing inversion domain-free GaN films on Si using an UHV MBE-SPM system. Single crystal ZrB_2 films had been grown on Si(111) by the thermal decomposition of single molecular precursor $Zr(BH_4)_4$. Annealing the film at 800^oC in UHV was enough to remove the surface oxides and recover the atomically smooth surface. The GaN grown on the oxide-free ZrB_2 by plasma-assisted MBE was found to be consistently N-polar independent of the growth conditions. The films were insulating and N-polarity was demonstrated by combined *in situ* RHEED and non-contact AFM study. Various interface structures were proposed and as a result of first principles calculations, a single interface structure leading to N-polar GaN growth was found most stable for the wide range of growth conditions. Ref. Y. Yamada-Takamura *et al.,* Phys. Rev. Lett. *in press.*

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