

Abstract Submitted
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Intrinsic Surface Reconstructions of Zinc-Blende GaN(001) Studied by Scanning Tunneling Microscopy¹ ARTHUR R. SMITH, MUHAMMAD HAIDER, RONG YANG, COSTEL CONSTANTIN, HAMAD AL-BRITHEN², ER-DONG LU, NANCY SANDLER, Nanoscale & Quantum Phenomena Institute, Ohio University, PABLO ORDEJON, Instituto do Ciencia de Materiales de Barcelona, Bellaterra, Barcelona, Spain — The intrinsic structures of semiconductor surfaces are important for epitaxial growth and future applications. Here we present a scanning tunneling microscopy study of the clean zinc-blende GaN(001) surface, free from the presence of arsenic. We find a sequence of reconstructions for the clean surface, beginning with 4x3 and including c(4x12), 4x7, c(4x16), 4x9, and c(4x20). Generally, all of these reconstructions are row-like. The 4x3 is a semiconducting surface structure with a bandgap, measured using tunneling spectroscopy, of 1.14 eV; the 4x3 is obtained under Ga-poor surface conditions and is compared with a model calculated using ab-initio techniques. The other reconstructions are metallic, obtained under Ga-rich surface conditions. They can be modeled using simple adatom schemes on top of a bulk-like Ga atom termination.

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