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Low-temperature Surface Structure of w-GaN(000-1) TIANJIAO CHEN, KANGKANG WANG, YINGHAO LIU, KENDAL CLARK, DANDA ACHARYA, MUHAMMAD HAIDER, ARTHUR SMITH, SAW-WAI HLA, Ohio University — The surface structures of the w-GaN(000-1) surface have been investigated using a combination of reflection high energy electron diffraction and low-temperature scanning tunneling microscopy. The sample is prepared using radio-frequency plasma molecular beam epitaxy on sapphire substrates. Cooling to room-temperature after growth shows 3x streaks, a signature of the N-polar surface. Initially, the samples were investigated using LT-STM at both 75 K and 4.6 K, revealing complex surface reconstructions not seen at room temperature. To gain further insights into the low-temperature structures, we have more recently carried out RHEED experiments to follow the surface as it is cooled from room temperature down to low temperature. Initial results on samples prepared in similar ways to those in the LT-STM experiments show a phase transition from the room-temperature diffraction pattern to a different pattern at 255 K. On-going work is attempting to understand this transition in comparison to the observed LT-STM images. Authors acknowledge support by NSF (grant Nos. 0304314 and 0730257).

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