

Surface Reconstructions of GaN (000 $\bar{1}$) at Low Temperatures

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Surface reconstructions of nitrogen polar gallium-rich GaN (000 $\bar{1}$) at low temperatures are studied using a low temperature scanning tunneling microscopy (LT-STM). The GaN samples are grown on sapphire substrate by using r.f. N-plasma molecular beam epitaxy (MBE) at 650 °C. The growth of the GaN sample is monitored using reflection high energy electron diffraction (RHEED), and known 1x1 and 3x3 reconstructed surface patterns are observed during the growth. After growth, the GaN sample is transferred into the LT-STM under UHV conditions. Novel surface reconstructions of GaN (000 $\bar{1}$) have been observed. The novel reconstructed surfaces show strong voltage dependence. Tunneling spectroscopy data has also been performed on the novel surface structures and is also presented. The voltage dependent STM images clearly reveal novel surface features associated with these structures which are further confirmed by the tunneling spectroscopy measurements.

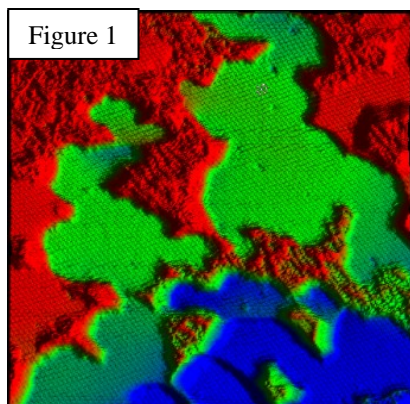


Figure 1

Figure 1: Image of GaN islands showing 3x3 reconstruction. STM Image taken at 80K image parameters $V=2.1V$ and $I=0.48nA$, Image Size 150\AA by 150\AA

Figure 2: Top row of images shows 4 novel reconstructions of GaN at 1.0V bias. Bottom row shows images of the same surface reconstructions at 200mV bias. All images taken at 5K

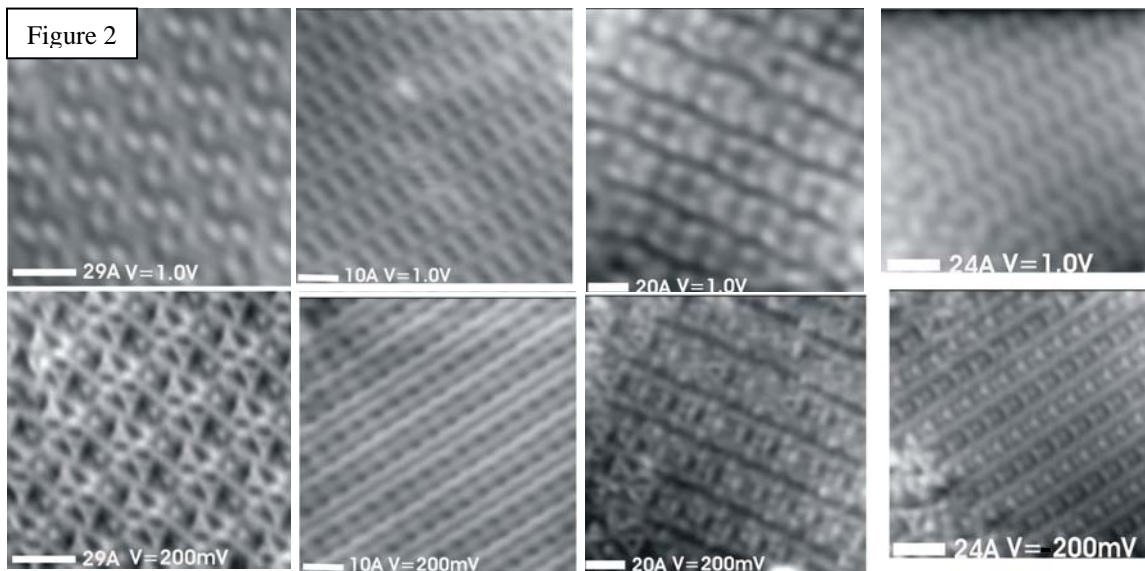


Figure 2