Ga"N/AlGaN

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1 1(a) GaN/AlGaN 1(b) GaN/AlGaN 1(c) AlGaN 2 6nm GaN 3nm AlGaN 6nm GaN/AlGaN 6nm GaN/AlGaN MOCVD GaN/AlGaN [0001] 1.4μm 2μm GaN(0002) 0.5nm GaN 0.5185nm [0001] 0.7μm 2×10⁶cm⁻² 1.4μm 2μm Al, Ga, AlGaN MOCVD GaN/AlGaN 1.4μm 2μm GaN(0002) 0.5nm GaN 0.5185nm [0001] 0.7μm 2×10⁶cm⁻² 1.4μm 2μm Al, Ga, AlGaN MOCVD GaN/AlGaN 1.4μm 2μm GaN(0002) 0.5nm GaN 0.5185nm [0001] 0.7μm 2×10⁶cm⁻²

Fig. 1 High-resolution cross-sectional TEM image showing the structure of the GaN/AlGaN SLS. The period of GaN/AlGaN SLS and the GaN crystal lattice are marked respectively. The crystal growth direction is [0001].

Fig. 2 Electron diffraction pattern showing characteristic of GaN/AlGaN SLS region. The inset is an enlargement of the (0002) reflection.
we find that in our samples the line defects are present in the buffer layer with a certain curvature, as shown by the arrows. This is analysis suggests that this curvature is mainly due to the epitaxial growth process. This is consistent with the literature (W...). The ring shape is slightly different from the [0001] planes in the sample. It is possible to see the influence of the line defects on the superlattice by measuring the influence range, which is approximately 150 nm, and the angle is 12°.

Fig. 3 Dislocations in GaN epilayer (b) is the enlargement of part of one thread dislocation.


GaN

MOCVD GaN/AlGaN GaN
TEM Analysis on GaN/AlGaN SLS*

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Abstract: 120 periods of GaN/Al_{0.15}Ga_{0.85}N superlattice structure (SLS) are grown by metal-organic chemical vapor deposition (MOCVD) on Al_{2}O_{3} (0001) single crystal substrates. The technology of laser lift-off is effectively used to prepare specimens for cross-section TEM. Transmission electron microscopy (TEM) reveals the good quality of undoped AlGaN/GaN SLS, and the periods of crystal lattice as well. Electron diffraction also shows the good quality of AlGaN/GaN SLS. In TEM images we find the assemble phenomenon of Al atoms or Ga atoms. These areas would induce new dislocations if the stress reaches the critical value. Most of the thread dislocations in GaN buffer layer shape like arcs, resulting in epitaxial growth.

Key words: GaN/AlGaN SLS; TEM; laser lift-off

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