

Supplementary information

Alignment control and atomically-scaled heteroepitaxial interface study of GaN nanowires

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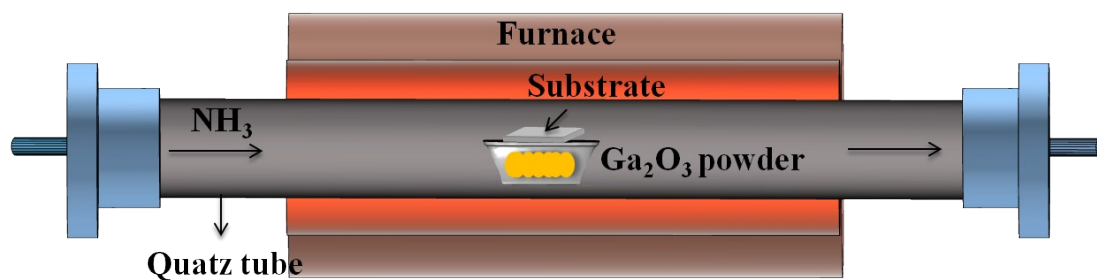


Figure S1. Schematic diagram of the experimental set-up for the epitaxial growth of aligned GaN nanowires; An alumina boat loaded with Ga₂O₃ powder is placed in the middle of the horizontal quartz tube and a piece of sapphire substrate is placed upon the alumina boat.

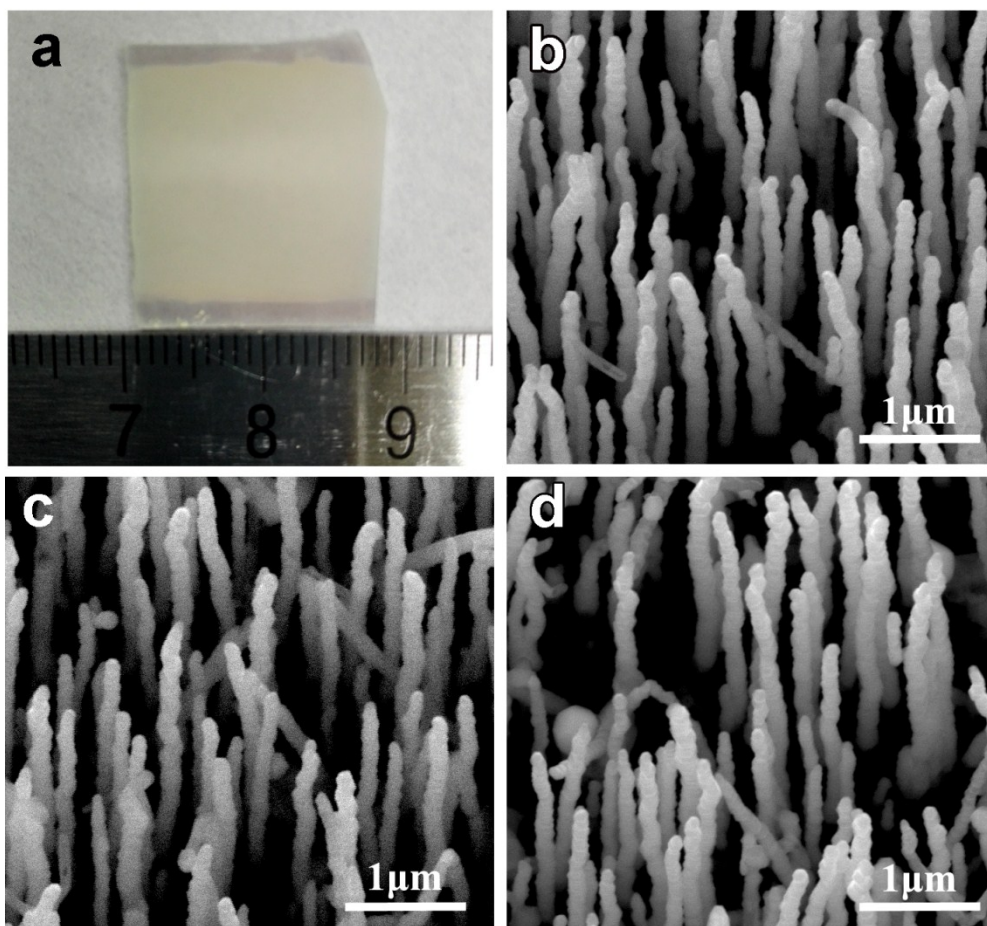


Figure S2. (a) Photograph of the well-aligned GaN nanowires grown on a 20*20 mm sapphire substrate; (b-d) typical SEM images of three randomly selected areas to show the uniformity of GaN nanowire arrays;

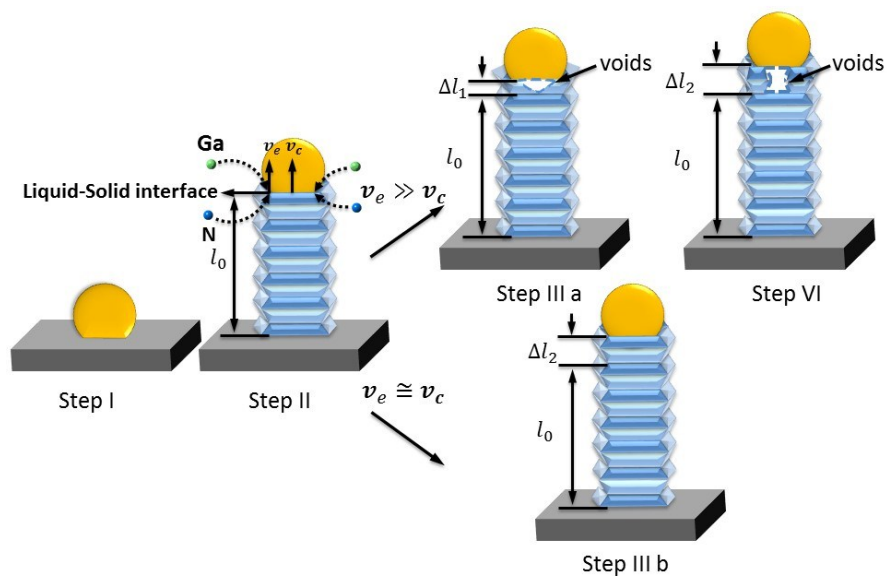


Figure S3 Schematic diagrams describing the nucleation and catalytic growth of highly-aligned corrugated GaN nanowire arrays and the mechanism of voids formation within the GaN nanowire based on VLS mechanism

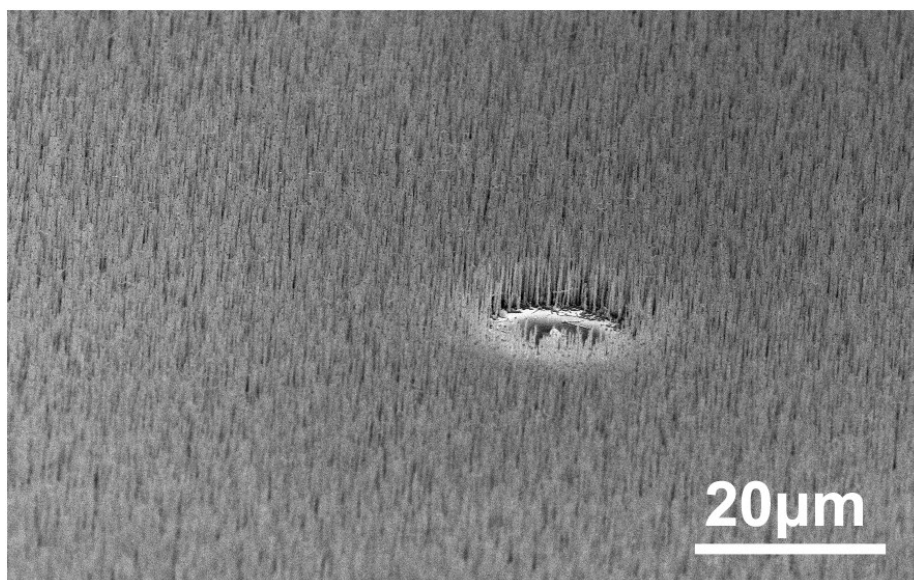


Figure S4 Low-magnification SEM image of GaN nanowires vertically grown on sapphire substrate; the area without GaN nanowires supports the VLS growth process due to the loss of Au catalyst;

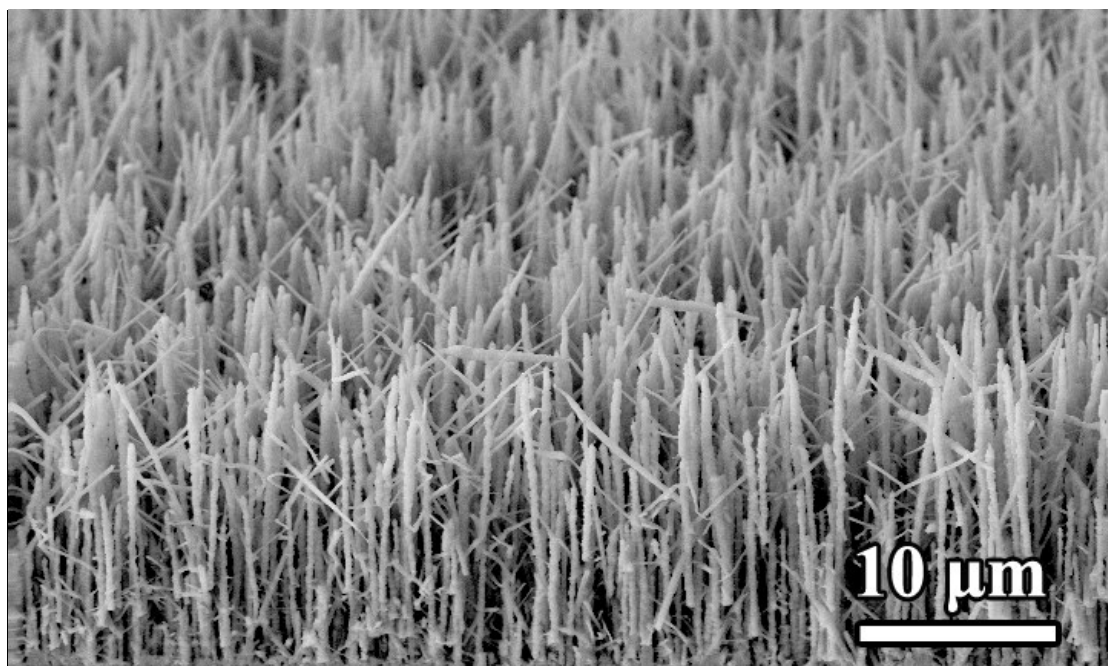


Figure S5 SEM images of GaN nanowire arrays at the growth temperature at 1150°C

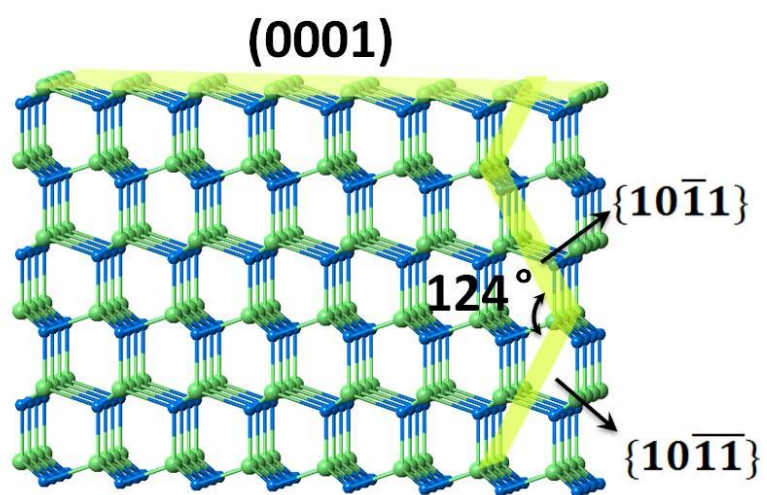


Figure S6 Atomic model of wurtzite GaN indicating the reciprocal crystalline $\{10\bar{1}1\}$ and $\{1011\}$ planes and their intersection angle

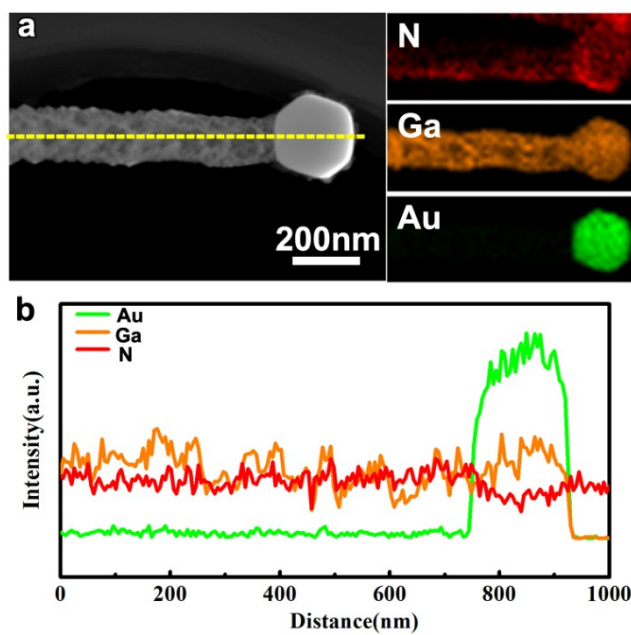


Figure S7 (a) STEM image of an individual epitaxially grown GaN nanowire and its elemental mapping of Ga, N and Au; (b) the corresponding line-scan elemental profiles taken along the axial direction;