

Investigation on the effect of V-type defects on the properties of GaN crystals and the
formation mechanism of surface V-type defects in GaN crystals

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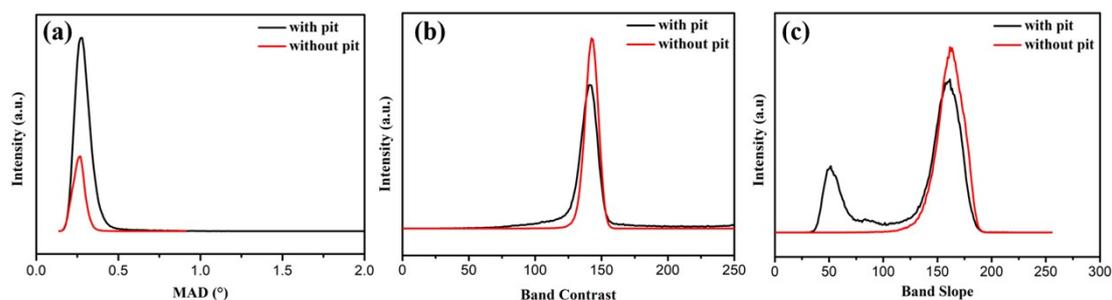


Fig. S1. Graphs of (a) Mean Angular Deviation (MAD), (b) Band Contrast, (c) Band Slope with V-shaped defects and defect-free regions obtained via EBSD testing

The graphs of Mean Angular Deviation (MAD), Band Contrast, Band Slope, and Pattern Quality of the regions with V-shaped defects and defect-free regions on the surface of GaN crystals, obtained via Electron Backscatter Diffraction (EBSD) testing, are presented in Fig.S1. As can be seen from Fig. S1(a), the peak value of the MAD curve for the region containing V-shaped defects is significantly higher than that of the defect-free region. This indicates that the presence of V-shaped defects increases the deformation degree of the GaN crystal, leading to a higher dislocation density inside the crystal and more severe lattice distortion. A decrease in Band Contrast usually implies an increase in defects within the crystal. These defects scatter electrons, weakening the intensity of Kikuchi bands, which is macroscopically manifested as a reduction in peak intensity in the graph. As shown in Fig.S1(b), the Band Contrast peak of the region with V-shaped defects is significantly reduced. Changes in Band Slope reflect the bending or strain state of the lattice. Strain causes

alterations in the width and slope of Kikuchi bands. Fig.S1(c) shows that for the region with V-shaped defects, not only does the Band Slope value decrease, but an additional peak also appears at the Band Slope of 50 on the left side. This phenomenon is significantly related to the change in the strain state of the GaN crystal caused by the presence of V-shaped defects. All the above test results indicate that the presence of V-shaped defects changes the stress state of the GaN crystal and increases its defect density.