Characterization of a 4-inch GaN wafer by X-ray diffraction topography

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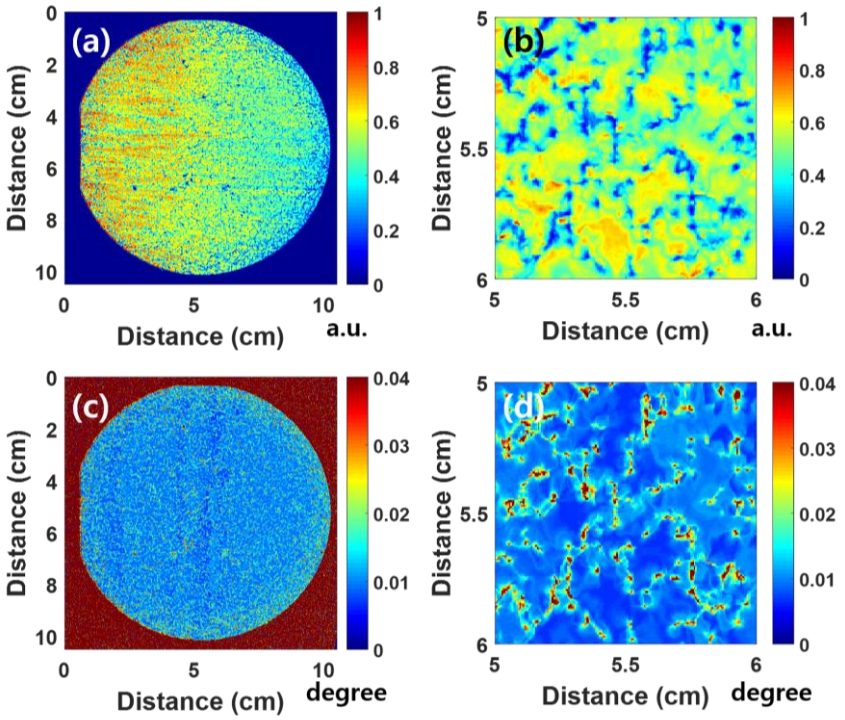
We have investigated the crystal quality of a 4-inch GaN wafer by X-ray diffraction topography. GaN ($11\bar{2}4$) diffraction images at various incident angles were obtained to determine the image of maximum intensity and full-width at half-maximum (FWHM). The images reconstructed from the maximum intensity at each detector pixel position indicated that the inhomogeneous crystal quality of the wafer originated from seed crystals during wafer manufacturing. The evaluated FWHM distribution tended to increase and become broader from the center to the edge of the wafer. The *q*-vector components evaluated from the two rocking-curve images at different azimuthal angles combined with the rotation matrix revealed that the overall lattice planes bowed towards the diagonal direction. A histogram on the tilting angle of the wafer showed that the most frequently observed angle was about 0.03°. We expect that our findings could be applied to wafer quality estimation.



4-inch GaN images reconstructed from peak intensity (a, b) and FWHM (c, d)

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