

Direct Growth of GaN on a 3C-SiC/Si Template

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GaN and SiC are candidates for the next generation power devices. 3C-SiC epitaxial growth technique on Si substrate is attracting widespread interest due to its low cost and large size. GaN/3C-SiC/Si, resulting from GaN directly grown on a 3C-SiC/Si template, offers new possibilities for GaN and 3C-SiC based vertical structure hybrid power devices. Here we report a method for the direct growth of GaN on 3C-SiC/Si template.

Experiments were performed using metalorganic vapor phase epitaxy. First, GaN was directly grown on a 3C-SiC/Si template without an AlN buffer layer. The result is shown in Fig. 1(a). We could only observe three-dimensional islands on the surface, which are formed due to the poor surface wetting of Ga atoms. To overcome the poor wetting of Ga, trimethylaluminum (TMAI) was induced before the GaN growth without NH₃ supply. We have previously reported that this method is effective in the direct growth of GaN on 6H-SiC via an ultrathin interlayer. [1] GaN film growth on 3C-SiC/Si template was realized (Fig. 1(b)), and a vertical series resistance of $8.02 \times 10^{-2} \Omega \cdot \text{cm}^2$ (Fig. 1(c)) was achieved, demonstrating the possibility of fabricating vertical structure devices using the new GaN/3C-SiC/Si structure.

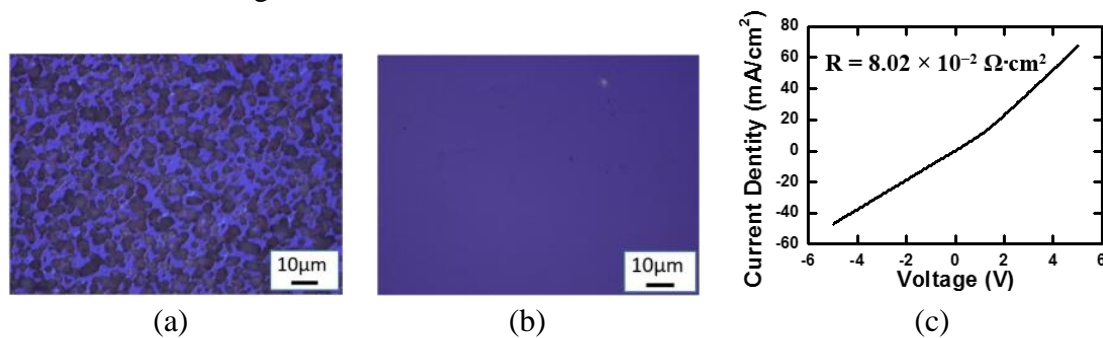


Fig. 1. SEM images of GaN growth on 3C-SiC/Si templates (a) without and (b) with TMAI treatment. (c) The I-V characteristics of GaN/3C-SiC/Si.

Reference

[1] Z. Sun, et al., Jpn. J. Appl. Phys. **55**, 010303 (2016).

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