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Self-assembled GaN hexagonal disks and pyramids grown on γ-$LiAlO_2$ by plasma-assisted molecular-beam epitaxy WEN-YUAN PANG, IKAI LO, Department of physics, National Sun Yat-sen University, Kaohsiung, Taiwan ROC., CHIA-HO HSIEH, Department of material and optoelectronic science, National Sun Yat-sen University, Kaohsiung, Taiwan ROC., YU-CHI HSU, Department of physics, National Sun Yat-sen University, Kaohsiung, Taiwan ROC., MING-CHI CHOU, Department of material and optoelectronic science, National Sun Yat-sen University, Kaohsiung, Taiwan ROC. — The self-assembled GaN pyramid, disk, and pillar have been grown on γ-$LiAlO_2$substrate by plasma-assisted molecular-beam epitaxy. We observed the largest GaN disk is 4.48 μm. Furthermore, a model was developed to demonstrate that the GaN disk was established due to Nitrogen atoms were captured by most-outside Gallium atoms, and pyramid was obtained by the missing of most-outside Nitrogen atoms. Transmission electron microscopy measurement shows that the epilayers of GaN disk were grown with a tilt angle of 28 degree. It conforms to the prediction of the model. The properties of luminescence measured by photo-luminescence and cathode-luminescence were under investigation. Base on the result, we proposed a GaN hexagonal disk p-n junction for high efficiency of optoelectronic device. * Published in Applied Physics Letters 94, 062105 (2009).

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