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MOCVD Epitaxy of GaN by Employing SiO₂ Colloidal Microspheres Templates XIAO-HANG LI, YIK-KHOON EE, GUANGYU LIU, PISIST KUMNORKAEW, JAMES F. GILCHRIST, NELSON TANSU, Lehigh University — Nitride semiconductors play an important role for light-emitting diodes (LEDs) and lasers in visible spectrum. Low dislocation density GaN is of great importance in achieving high efficiency nitride LEDs and reliable lasers Here, we investigate the growth mechanism of GaN by employing SiO₂ colloidal microspheres as a mechanism to reduce the dislocation density of the GaN template growths. Very few studies have been carried out on the influence of implementing the colloidal microspheres as mechanism to reduce dislocation density in GaN epitaxy. The monolayer of silica microspheres arrays is deposited on an existing n-type GaN template, and we performed two-step epitaxy processes to achieve good coalescence of the grown film by covering the microspheres. The characterization by employing atomic force microscopy and scanning electron microscopy of optimized film indicated high quality GaN templates. The growths of InGaN-based quantum wells LEDs were performed on the template, and the electroluminescence shows these devices exhibited enhanced luminescence efficiency in comparison to the conventional devices.

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