

Abstract Submitted
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Templated growth of sub-20nm GaN nanostructures using Block Copolymer Lithography KASIRAMAN KRISHNAN, AZAR AL-IZADEH, CHRISTOPHER KEIMEL, SETH TAYLOR, STEVEN LEBOEUF, SURYAPRAKASH GANTI, GE Global Research — Templated growth of Wide Band Gap nanostructures allows for a precise control over quantum dot size and location, and avoids the nonradiative defects associated with the direct writing techniques. Here we report templated growth of Gallium Nitride nanostructures inside sub 20 nm SiO₂ windows using Metal Organic Chemical Vapor deposition (MOCVD). The SiO₂ templates were produced by Block copolymer lithography and Reactive Ion Etching (RIE). Polystyrene-b-poly(methyl methacrylate) with cylindrical morphology was oriented perpendicular, by surface treatment with a self-assembled monolayer of a fluorosilane and controlled UV exposure, or by coating with random copolymer brush. The PMMA was selectively removed by RIE and patterns transferred to SiO₂. The templates were then used to control both the homo and heteroepitaxial growth of GaN nanopillars with MOCVD. The morphology was characterized by SEM; Cathodoluminescence, Photoluminescence and TEM were further used to examine the defect densities.

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