

Abstract Submitted
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Controlling Nanostructure Self-assembly for Design of Three-dimensional Semiconductor Heterostructures¹ SANTINO D. CARNEVALE, J. YANG, P.J. PHILLIPS, M.J. MILLS, R.C. MYERS, Dept. of Materials Science and Engineering, Ohio State University — We examine the control of vertical and coaxial growth in self-assembled GaN/AlN nanowires grown on Si (111) by plasma assisted molecular beam epitaxy. To grow nanowires vertically and not radially a two-step growth method is used. Nanowires are nucleated at low temperatures and grown vertically at high temperatures, allowing for independent control of density and height and constant radius. A second method is used to promote radial growth. GaN nanowire cores are formed, then growth temperature is reduced and growth continues. Vertically and coaxially oriented AlN/GaN heterostructures grown using these methods are presented. We discuss the structural and optical properties of these GaN/AlN quantum disk and core-shell heterostructures using scanning electron microscopy, scanning transmission electron microscopy, and temperature dependent photoluminescence measurements.

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