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Formation and Properties of Self-Assembled Ni Nanodots and VLS Growth of GaN Nanowires D. AURONGZEB, G. KIPSHIDZE, B. YAVICH, A. CHANDOLU, J. YUN, V. KURYATKOV, I. AHMAD, H. TEMKIN, M. HOLTZ, Texas Tech University, Lubbock, Texas 79409 — We report the formation of Ni nanodots and subsequently use them to grow GaN nanowires. For the Ni nanodots both Si(111) and sapphire substrates are used. Layers of Ni are deposited with different thickness (1 to 5 nm) on these substrates using UHV electron-beam evaporation. The layers are annealed ex situ and the nanodot formation is studied for different anneal temperatures and durations. For nanodot formation on Si(111) the process is self limiting at high temperature with distinct facets. Activation energies are consistent with Ni surface diffusion as the primary formation mechanism. Nanostructures on sapphire are droplet shaped, we observe no distinct faceting. The nanodot size can be controlled with initial Ni thickness. Based on these studies, we have grown GaN nanowires on sapphire substrates covered by Ni layers having various thickness. Vapor- liquid-solid growth mechanism is demonstrated using a pulsed metal-organic chemical vapor deposition approach. The GaN nanowires are straight, vertically oriented, and of constant diameter following the same trend as the Ni nanodot diameter with initial thickness. We report control of GaN nanowire diameter and length up to 1 micron.

Mark Holtz
Texas Tech University

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