

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Droplet heteroepitaxy of zinc-blende vs. wurtzite GaN quantum dots C REESE, S JEON, Department of Materials Science and Engineering - University of Michigan, T HILL, C JONES, Department of Physics - University of Michigan, S SHUSTERMAN, Soreq Nuclear Research Center, Y YACOBY, The Hebrew University of Jerusalem, R CLARKE, H DENG, Department of Physics - University of Michigan, RS GOLDMAN, Department of Materials Science and Engineering - University of Michigan — We have developed a GaN droplet heteroepitaxy process based upon plasma-assisted molecular-beam epitaxy. Using various surface treatments and Ga deposition parameters, we have demonstrated polycrystalline, zinc-blende (ZB), and wurtzite (WZ) GaN quantum dots (QDs) on Si(001), r-Al₂O₃, Si(111), and c-GaN substrates. For the polar substrates (i.e. Si(111) and c-GaN), high-resolution transmission electron microscopy and coherent Bragg rod analysis reveals the formation of coherent WZ GaN QDs with nitridation-temperature-dependent sizes and densities. For the non-polar substrates (i.e. Si(001) and r-Al₂O₃), QDs with strong near-band photoluminescence emission are observed and ZB GaN QD growth on Si(001) is demonstrated for the first time.

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Date submitted: 18 Nov 2015

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