Abstract Submitted
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The effect of capping chemistry on GaSb Quantum Dot shape and photoluminescence[1] MATT DEJARLD, Univ of Michigan - Ann Arbor, ERWIN SMAKMAN, Eindhoven University of Technology, MARTA LUENGO-KOVAC, ANDREW MARTIN, VANESSA SIH, Univ of Michigan - Ann Arbor, PAUL KOENRAAD, Eindhoven University of Technology, JOANNA MILLUNCHICK, Univ of Michigan - Ann Arbor — GaSb quantum dots are known to disintegrate upon capping with GaAs, leading to an increase Sb incorporation into the wetting layer. Preventing Sb diffusion from the quantum dot could improve the retention of the dot shape and reduce wetting layer thickness. To test this theory, the quantum dots were capped with four different capping layers: 50nm of GaAs, 1 monolayer (ML) of AlAs with 50nm of GaAs, 3ML of AlAs with 50nm of GaAs, and 20nm of $Al_{0.5}Ga_{0.5}As$ with 30nm of GaAs. A clear improvement in the retention of the shape was observed in the Al-containing caps. In this case, at least 70% of the dots retained their shape and had an average height of 4.5nm, compared to only 45% retaining their shape and having a height of 3nm for the GaAs-capped samples. However, the strain induced by the larger dots caused stacking faults to form. Photolumiescence shows that the wetting layer peak shifted towards higher energies in Al containing samples, consistent with a reduction in wetting layer thickness. The dot peak was at approximately the same position in all four samples, perhaps due to the fact that the defects present near the larger dots made them optically inactive.

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