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Air-Stable Field-Enhanced III-Nitride Photocathodes ROBERT STRITTMATTER, Jet Propulsion Labs, JORDANA BLACKSBERG, Jet Propulsion Labs, SHOULEH NIKZAD, Jet Propulsion Labs, AMIR DABIRAN, SVT Associates, ANDREW WOWCHAK, SVT Associates, PETER CHOW, SVT Associates
— We report on recent investigations of Si delta-doping by molecular beam epitaxy (MBE) near the surface of p-type GaN films to attain high efficiency photocathodes for use in intensified ultraviolet imagers. These delta-layers are prepared to achieve effective negative electron affinity (NEA) without the use of low work function metal coatings, such as cesium, which are suitable only in ultra-high vacuum environments. Hall measurements, secondary ion mass spectrometry (SIMS), and capacitance-voltage (C-V) depth profiling reveal highly confined delta-layers with activated carrier densities in excess of 10^{14}cm^{-2} as close as 2 nm from the semiconductor surface. When the delta-layer is biased relative to the bulk, a large field-enhancement of the photoelectron yield is observed. In addition to UV spectroscopic quantum efficiency data, we will present total electron yield measurements for these photocathodes under electron-beam bombardment at various incident energies.

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