Abstract Submitted
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Electronic states of plasma-enhanced atomic layer deposited SiO2 on GaN[1] BRIANNA ELLER, WENWEN LI, SARAH RUPPRECHT, SRABANTI CHOWDHURY, ROBERT NEMANICH, Arizona State University, ARPA-E SWITCHES COLLABORATION — Silicon dioxide is a stable dielectric with a large bandgap that leads to effective band offsets suitable for wide bandgap semiconductor electronics. This research is focused on band offsets and bending for plasma-enhanced atomic layer deposited (PEALD) SiO2 on in-situ cleaned GaN. We have investigated low-temperature SiO2 using tris(dimethylamino)silane (TDMAS) and oxygen plasma on GaN substrates. Thin film thicknesses, compositions, and band offsets were determined with *in-situ* x-ray photoelectron spectroscopy (XPS). Results showed the growth rate for TDMAS and oxygen plasma process increased as temperature decreased within the ALD regime. The growth rate was higher at 550 C, which was likely the result of thermal decomposition of TDMAS. Results also demonstrated temperature does not greatly affect the stoichiometry of the films. A more detailed analysis showed increasing deposition temperature resulted in a secondary O1s peak; however, this peak was not present for thick films. This secondary peak likely suggests the high temperature may relate to the oxidization of the GaN substrates. This effect may also explain the variation in observed valence band offsets (VBO), where the measurement technique does not account for the potential drop across the interfacial Ga-O layer. The next stage of this work will employ electrical measurements to ascertain the quality of this interface on SiO2/Si.

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