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Characterization of the GaN-MgO Transistor Interface: More Power and Efficiency[1] JOSE SANCHEZ, University of Puerto Rico at Mayaguez, DIVINE KUMAH, FRED WALKER, Yale University — In this age of high-energy consumption, the development of more efficient and more reliable devices is indispensable. Gallium nitride (GaN)-based devices are an option in achieving this goal. GaN's wide bandgap of 3.4 eV allows the device to handle large amount of current before leakage makes its energy consumption inefficient. The characteristics of GaN, in conjunction with those of Magnesium oxide (MgO), would allow for improvement of different electronic applications such as mobile phone communication technology. In this work, the fabrication of the GaN/MgO device was done by Molecular Beam Epitaxy. This device was grown under a variety of parameters where the growth temperature, growth chamber pressure, and the rate of material deposition were changed. To determine the optimal growth parameters, current-voltage and capacitance-voltage measurements were conducted on to evaluate the effects of these growth conditions. Atomic Force Microscopy was also used in characterizing the crystallinity and morphology of the samples. A conclusion of the research is that by improving the roughness of the substrate, the breakdown voltage of the MgO layer and the overall performance of the device can be improve, yielding a device with very low energy loss in the current transmission process.

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