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Nm-scale Mapping of Thermally-Activated Trap Emission in an AlGaN/GaN High Electron Mobility Transistor D. CARDWELL, A.R. AREHART, S.A. RINGEL, J.P. PELZ, The Ohio State University — AlGaN/GaN high electron mobility transistors (HEMTs) are intrinsically ideal for high frequency and high power applications, but have degraded performance due to charge trapping. Nm-scale AFM-based electrical measurements sensitive to the emission of trapped charge, such as scanning Kelvin probe microscopy (SKPM), can, in principle, be used to determine the energies, cross sections, and densities of electrically-active traps with high spatial resolution. Using SKPM, we obtain nm-scale surface potential transient (SPT) maps over the entire surface of an AlGaN/GaN HEMT. Surprisingly, we find significant SPTs near the edges of the device that are similar to conductance transients, and whose time constants vary with temperature, indicating thermally-activated emission. Comparison of nm-scale measurements and electrostatic simulations will be discussed to quantify the spatial distribution of trapped charge near the edge of the device. Work supported by ONR-DRIFT (P. Maki).

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