BTI is a very important reliability concern for GaN MOSFET/MISHEMT structures, which may replace HEMTs for certain applications. Researchers found GaN MOSFET shows 3 NBTI-induced Vt-shift regimes: first negative, then positive, and finally negative again. The 3 regimes are interpreted as electron detrapping from oxide traps (initial negative Vt shift), electron trapping in the GaN channel under the edge of the source and drain (positive Vt shift during stress), and generation of interface states at the oxide/GaN interface (permanent negative Vt shift after the positive Vt shift). The reliability studies may help remove one of the roadblocks for technology commercialization.

Fig. A. The GaN MOSFET structure studied in this work.

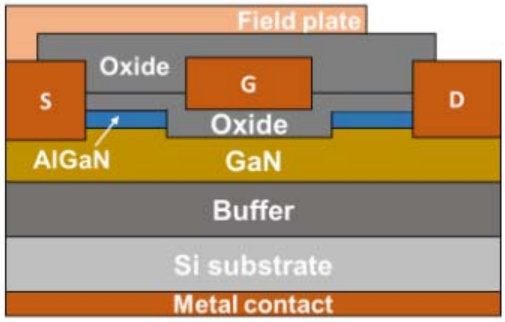

Fig. B. The NBTI Vt shift as a function of stress time for V_{GS}=-10V at 75, 100, 125, and 175°C. The 175°C Vt data clearly show complex 3-regime behavior, which is interpreted as electron detrapping for initial negative Vt shift (<1sec), localized electron trapping next to S/D for positive Vt shift (1~100sec), and interface state generation for negative Vt shift (>100sec).