SESSION 10a: POWER DEVICES II

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Presentations in this session describe a variety of power devices, ranging from SiC diodes with high breakdown voltages to GaN HEMTs fabricated using nano-rods. In the first paper, Megan Snook and co-workers from Northrop Grumman present a method for addressing a key problem with fabrication of high voltage SiC diodes: the large density of defects across the wafer. Small diodes were fabricated across a wafer and tested, followed by an interconnection of the working devices to yield a single large device with an active area of 11.72 cm^2. This diode produced a peak current of 96 kA, along with a diode action of 1.7 MA^2-sec. The second paper from Yen *et al.* of ITRI compares two different designs of 4H-SiC Schottky rectifiers: dual-metal trench Schottky barrier diodes (DM-TSBD) and trench MOS barrier Schottky diodes (TMBS). Numerical simulations are used to determine how each design can be optimized to obtain low forward voltage and low reverse leakage current, ultimately showing the advantages of the TMBS design. In the third paper, Su *et al.* of Ford Motor Company provide guidance on how CS devices may penetrate the lucrative automotive industry. They examine the requirements for GaN power transistors to compete with the silicon IGBT currently incumbent for automotive components. The substrate requirements are discussed, comparing GaN with GaN-on-Si. Also, the type of transistor structure is evaluated along with the requirement for normally-off operation, suppression of current collapse, and short-circuit withstand capability. The fourth entry is a student paper from Lee *et al.* of Hongik University and discusses the performance of an AlGaN/GaN-on-Si HFET with a dual field plate. Simulation results show that the potential at the drain side is spread out using this device geometry, and experimental results illustrate that the breakdown voltage increased by 11.3%. In the final paper, Lee *et al.* from ITRI describe a unique GaN HEMT that is fabricated using nano-rods. The use of nano-rods in this device enables both normally-off operation and low on-resistance. The process for fabricating HEMTs using nano-rods is described in detail.