SESSION 13: GaN POWER SWITCHING

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With each passing year the promise perceived for wide band gap semiconductor devices becomes more a reality as prototype devices are steadily transitioned to products. This session focuses on high power switching capabilities. In our opening invited paper, Michael Briere of ACOO LLC Enterprises presents an exciting vision of a future where adoption of efficient wide band gap devices for power electronics is widespread. According to Dr. Briere, this can result in a 25% reduction in worldwide power consumption in 2025 and an attendant reduction in the need for new power plants. Following this, Marianne Germain of IMEC discusses progress in her lab in the development of III-N devices for price-effective power devices using GaN-on-Si up to 200mm diameter. Significant progress has been achieved using DHFET (SiN/AlGaN/GaN/AlGaN) with *in situ* SiN acting as an additional part of the barrier, defining the 2DEG. Dr. Germain will discuss this and progress towards Si-CMOS-compatible GaN-on-Si. Moving from these broad perspectives to the practical issues of power device fabrication, our next paper, presented by Ogyun Seok of Seoul National University, shows that by using rf-pecvd-deposited diamond-like carbon for passivation an impressive breakdown > 1400V can be achieved for AlGaN/GaN Schottky Barrier Diodes. Next Chunhua Zhou of HKUST reports that by combining enhancement and depletion mode channels on a Lateral Field Effect Rectifier, a 53% lower on-resistance can be obtained (compared to a conventional L-FER) while maintaining equivalent punch-through immunity. Finally, Minki Kim, also of Seoul National University, describes an AlGaN/GaN power HEMT with a gate edge recess. Compared to a FET without this recess, the breakdown voltage is raised by 100V and the leakage current reduced by an order of magnitude with only a slight reduction in current.