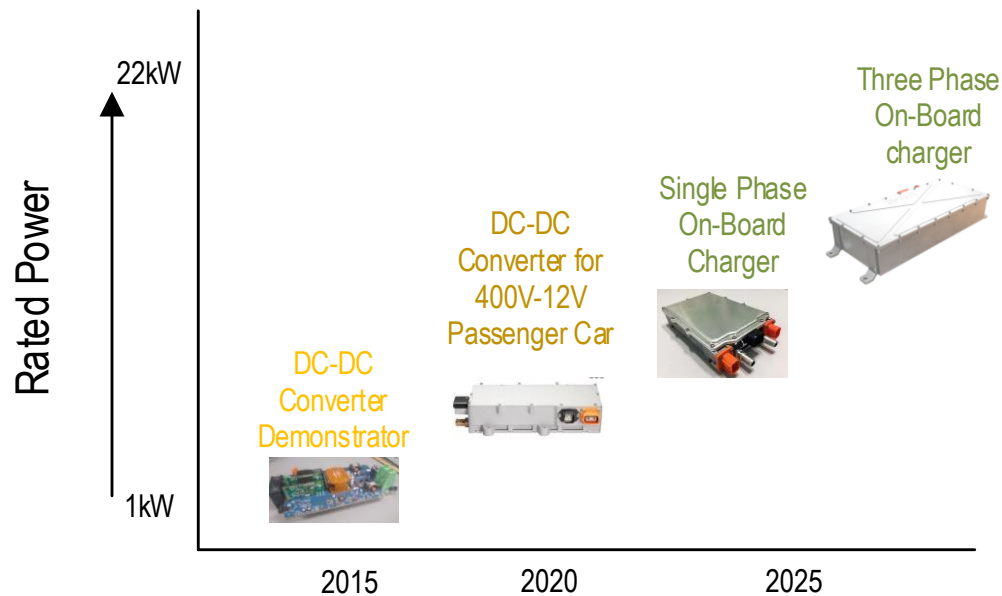


GaN in the Automotive Market

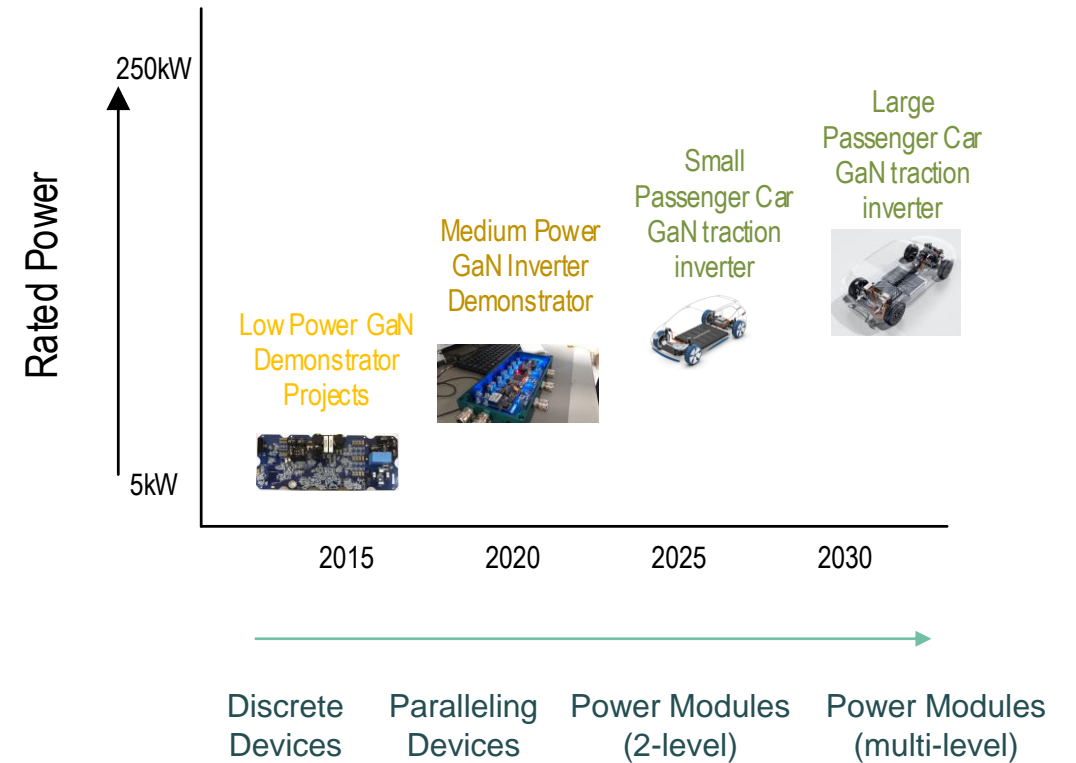


- GaN in On-board Chargers and DC/DC Converters
 - 2030 targets: 9kW/kg, 10kW/L, 96.5%, \$11.5/kW
 - Requires isolation between HV and LV



- Other auto applications: audio, small motor actuation, wireless charging

- GaN in Traction Inverters
 - 2030 targets: 36kW/kg, 37kW/L, 97.5%, \$3.5/kW



GaN vs SiC for 30kW traction inverter

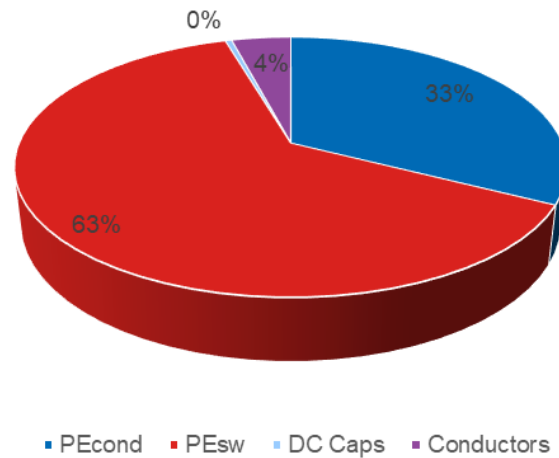
- SiC metrics

- Peak efficiency: 97.4%
- Weight: 3.3kg
 - Gravimetric Power Density 9kW/kg
- Volume: 2L
 - Volumetric Power Density 15kW/L

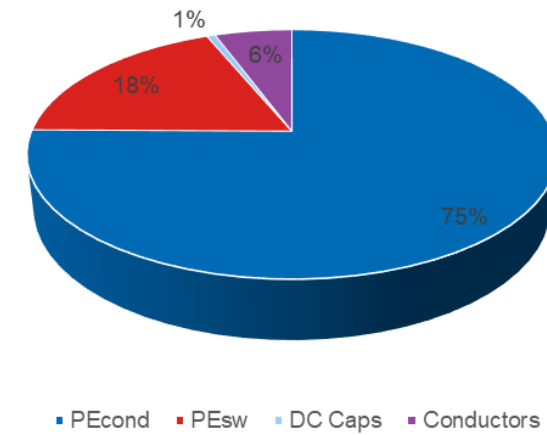
- GaN metrics

- Peak efficiency: 98.1%
- Weight: 3.2kg
 - Gravimetric Power Density 9.3kW/kg
- Volume: 1.5L
 - Volumetric Power Density 20kW/L

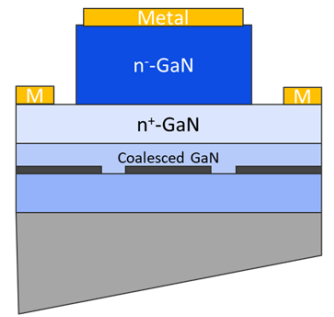
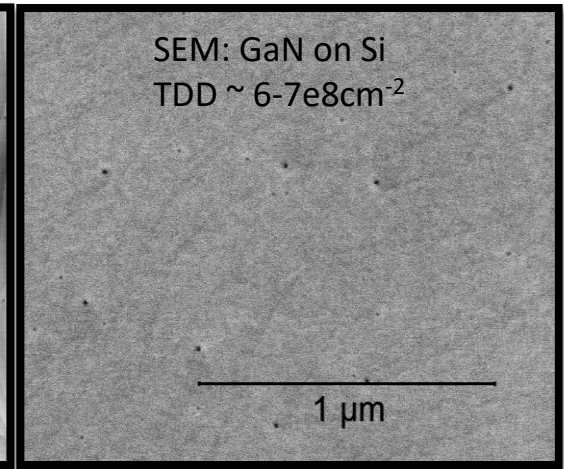
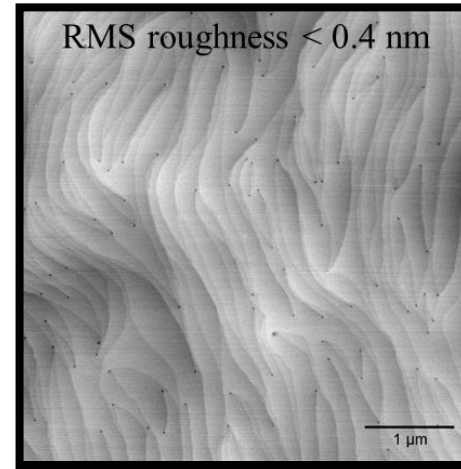
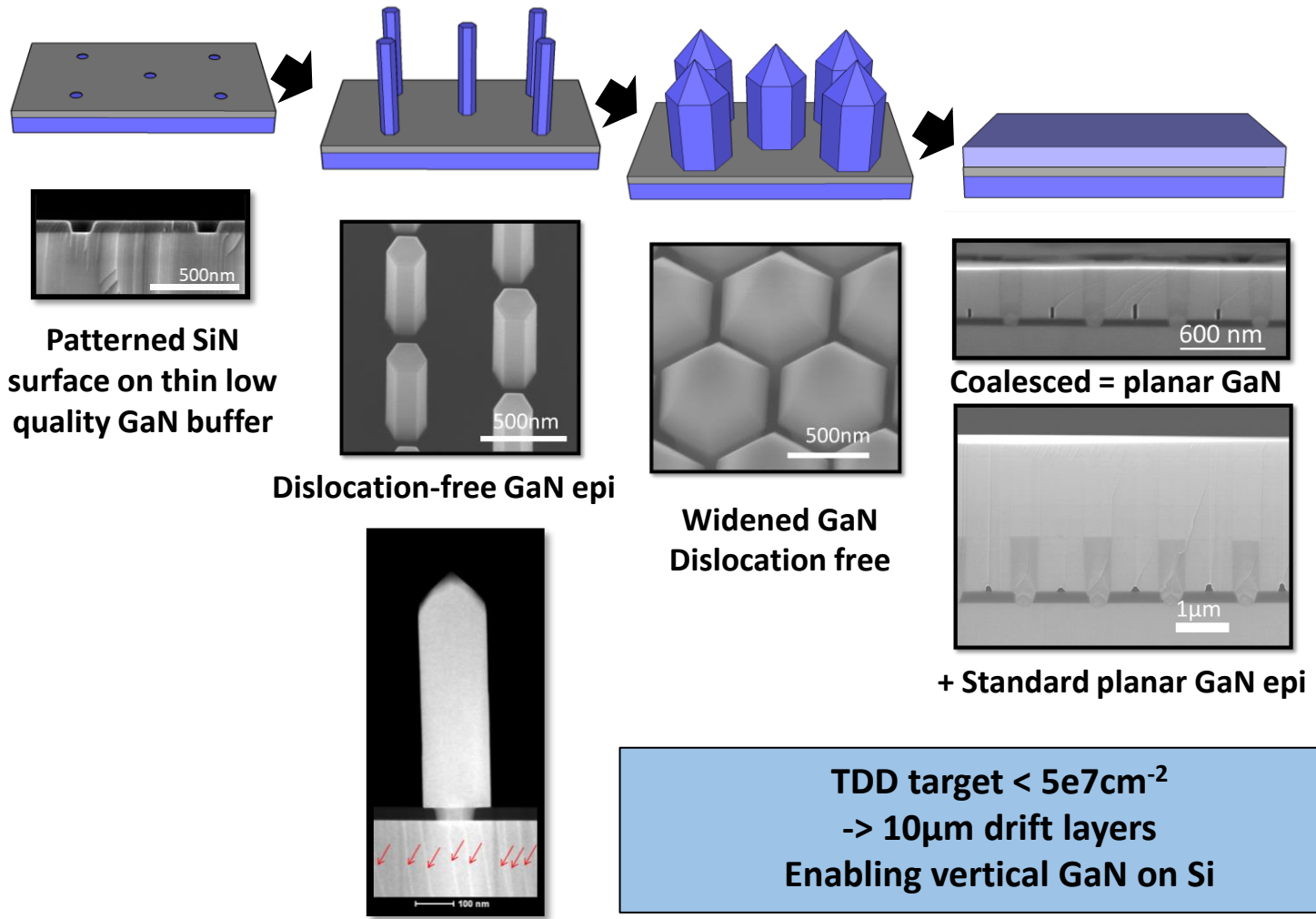
Propulsion Inverter Losses Using SiC



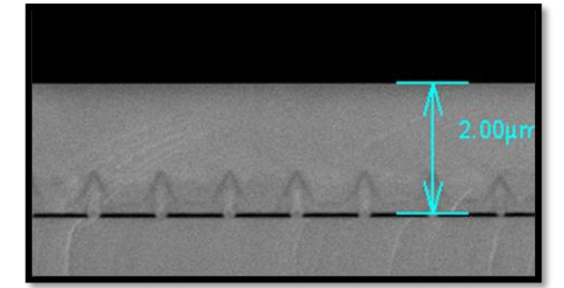
Propulsion Inverter Losses Using GaN



Hexagem Coalesced GaN on Silicon



Semi-vertical SB diodes in processing

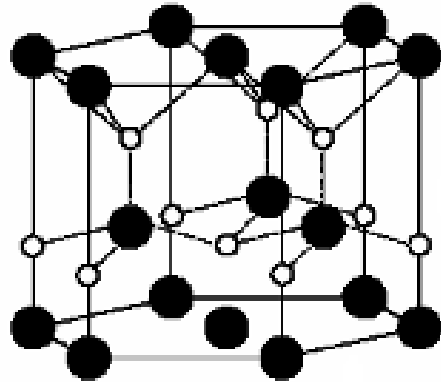


2 μm GaN on Silicon

mikael.bjork@hexagem.se

Crystal Structure

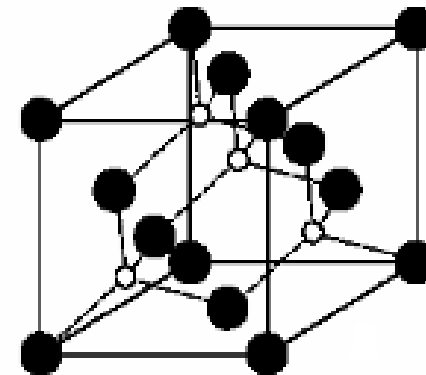
Hexagonal-GaN



○ Nitrogen ● Gallium



Cubic-GaN



Higher crystal symmetry offers;

- Higher bulk electron mobility => lower R_{on} vertical devices
- Higher hole concentration and mobility => high performance p-type devices

With the same high breakdown capability