Ascatron develops next generation Silicon Carbide (SiC) power semiconductors radically reducing electrical conversion losses. With our **3DSiC®** technology we provide doped device material structures based on epitaxy, exceeding state of the art quality and increasing device performance. Target applications range from high temperature for harsh environment to high voltage for wind energy, traction and data centers, as well as volume markets for solar and automotive.

Ascatron started the operation in 2011 to scale-up the SiC material and device technology developed at the Swedish R&D institute Acreo. Our SiC epi material fabrication and device prototyping is located in the Electrum Laboratory in Kista-Stockholm. The clean-room with total area of 1300m^2 hosts a complete line of process tools for 100mm and 150mm SiC material and device wafer fabrication.

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SILICON CARBIDE EPI & DEVICE

ascatron

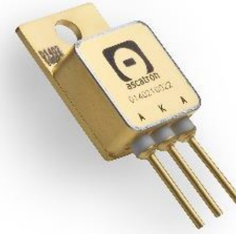
3DSiC® POWER DEVICES

epitaxial doped structures

To make the most efficient power devices, Ascatron combines conventional semiconductor processing technology with in-situ doped epitaxy material grown on structured surfaces or in deep etched trenches. By this we increase material quality especially in high doped regions and enable device concepts with low losses, high voltage capability, and reliable operation at high temperature.

3DSiC® implementations

- **Buried Grid** to reduce electric field for higher voltage
- **Super Junction** material to lower on-state resistance
- **Vertical Channel** transistors to increase power density



JFET & MOSFET

BJT & IGBT

JBS & PiN

Sensors

MATERIAL FABRICATION

for high performance devices

Low doped drift layers
Efficient buffer technology
Thick layers with low defect density

Epi layer structures
Various doping levels
Including pn-junctions

In-process epitaxy
Embedded & buried structures
High doped contact layers

DEVICE PROTOTYPING

for fast design verification

Complete process line
Prototype fabrication
Pilot production

Process control
Traceability
Standard unit process modules

Performance evaluation
Measurement & analysis
Wafer level testing

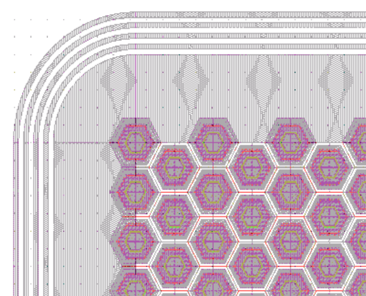
SiC Epitaxy Production
Horizontal hot-wall CVD reactors
LPE PE106, Aixtron/Epigress VP508 & VP2400
3”, 100mm & 150mm wafers
4H, 6H & 3C-SiC
n-doping 10^{14} - 10^{19} cm^{-3}
p-doping 10^{14} - 10^{20} cm^{-3}
Thickness 0.1 - 250 µm

100mm & 150mm SiC Wafer Fab
Epitaxy – SiC CVD
Surface – Planarization & CMP
Lithography – 0.5µm stepper
Etching – ICP & RIE
Implantation – Al, B, N, P – 500°C
Anneal – RTP & high temperature furnace
Dielectrics – Thermal, LTO, PECVD, ALD
Metals – Ti, TiW, Al, Au, Ag, Ni & silicides
Dicing

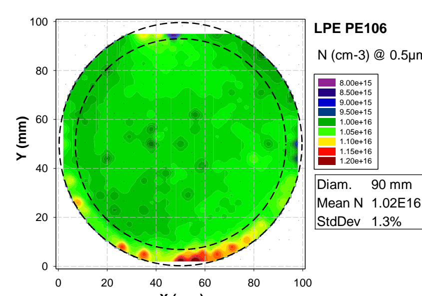
Metrology
FTIR, C-V, Candela, KOH etching
Surface profiler & AFM
High resolution SEM, TEM, & FIB
X-ray diffraction
Ellipsometer & Sheet resistance

Electrical Measurement
Automatic wafer probing

HIGH PERFORMANCE POWER DEVICES BASED ON ADVANCED SiC MATERIAL TECHNOLOGY

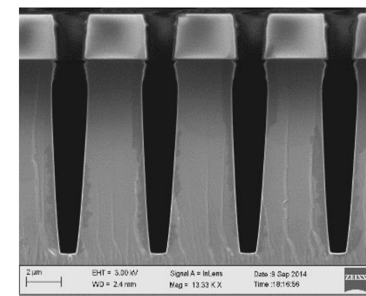


Device Design
Optimize your system with Ascatron technology.

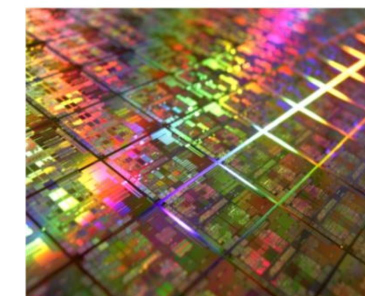


Advanced SiC Epitaxy
Multilayer pn-junctions & embedded structures

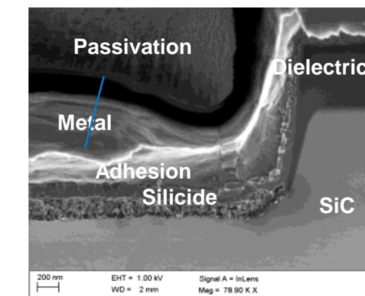
Ion Doping Process
High energy implantation & high temperature anneal



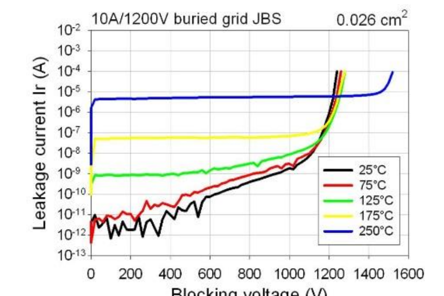
Deep Trench Etching
Precise side-wall control for void-free regrowth



Oxidation Process
Combining deposition and thermal anneal



Metallisation System
Wide range of metal and passivation combinations



Device Performance
Electrical testing verifying specification