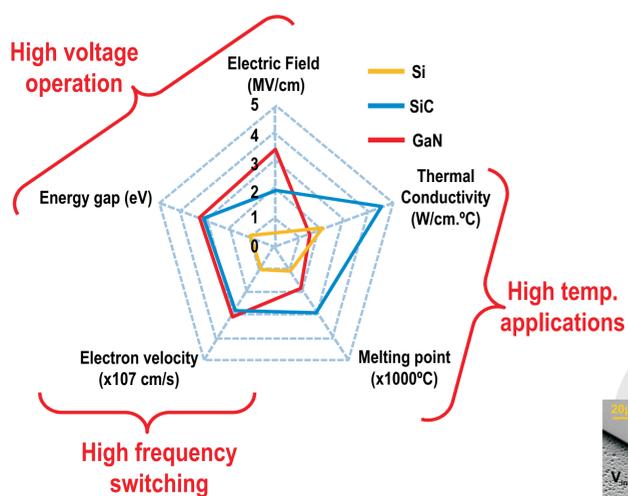


# POWERDEVICES&SYSTEMS

## WIDEBANDGAPSEMICONDUCTORDEVICES

Wide BandGap semiconductors research activities are focused on the development of technological processes optimized for wide gap semiconductors (SiC, GaN and diamond) and on the design and fabrication of new power devices based on these materials for high-voltage and high temperature.

### Wide BandGap: Wide range of applications



### Power Devices

Switches

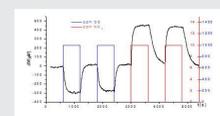
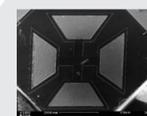


Power Rectifiers (Schottky, JBS and PiN)



### High Temp. sensors

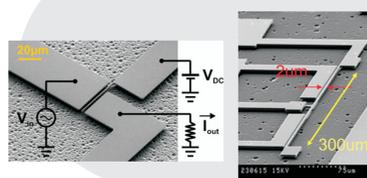
Hall sensors Gas sensors



UV detectors



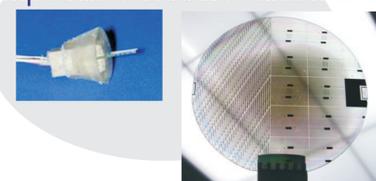
### Micro-Nano resonators



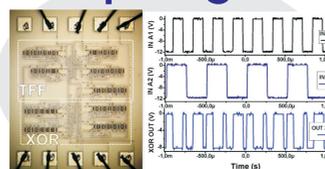
SiC full optimized technology modules allow to study a wide range of devices and sensors

### Biomedical Sensors

Impedance Needles and MEAs

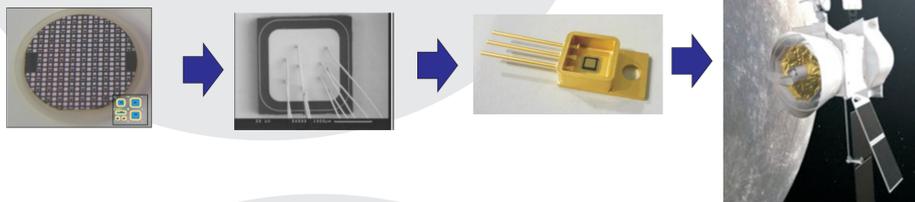


### High Temp. Digital ICs



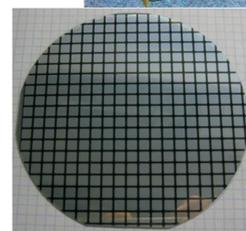
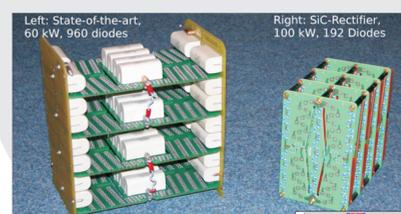
### High-Temperature SiC Diodes

High temperature SiC blocking diodes for solar panel arrays: series protection devices for solar cells arrays. ESA space mission BepiColombo will set off on a journey to Mercury lasting approximately 6 years Working temperature range -170C to +300C High reliability, radiation hard Stable with thermal cycling

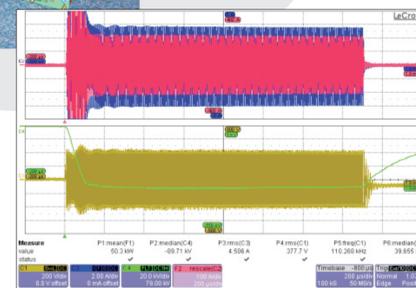


### SiC diodes based multiplier circuit

Optimized for Philips X-Ray medical equipments in the framework of Eniac SmartPM project



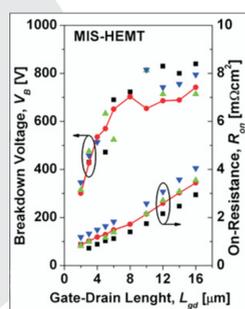
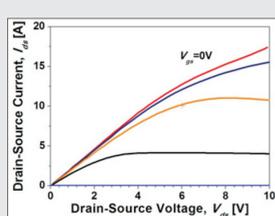
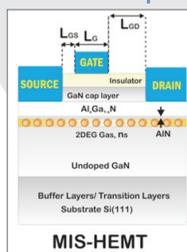
4-inch SiC diodes wafer



Ramp-up at -92 kV / 42 kW

### GaN on Si HEMT Devices

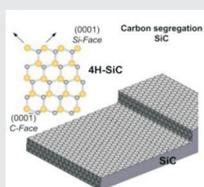
Heterojunction devices AlGa<sub>n</sub>/Ga<sub>n</sub>, InAlN/GaN MIS gate Up to 1000V and 300°C Developed for ON-Semi



### Graphene growth on SiC

Growth

Epitaxial growth on SiC (since 2007) and CVD growth on Cu (2012)



graphene ribbon

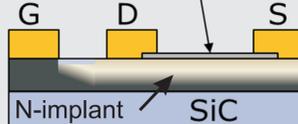
Processing

"Standard" processing EBL + RIE + E-gun



Best cases:  $n=1011 \text{ cm}^{-2}$ ,  $\mu=11.000 \text{ cm}^2/\text{Vs}$  at 4.2 K

Devices



Bottom-gated epitaxial graphene suitable for Half-Integer Quantum metrology