Silicon Carbide Power Technology for Energy Eficient Devices

PROJECT DETAILS

Funding Programme:
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Sub-Programme:
Nanosciences, nanotechnologies, materials and new production technologies (NMP)
Funding Scheme:
Large-scale integrating project
Project Reference:
604057; UE-14-SPEED-604057
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€ 698.572'80

Website:
http://cordis.europa.eu/projects/rcn/111073_en.html

PROJECT DESCRIPTION

Highly efficient Power Electronics (PE) employed in power generation, transmission, and distribution is the prerequisite for the Europe-wide penetration of renewable energies; improves the energy efficiency; increases the power quality and enables continuous voltage regulation, reactive power compensation and automated distribution. It also facilitates the integration of distributed resources like local energy storages, photovoltaic generators, and plug-in electric vehicles.

The development of a new generation of high power semiconductor devices, able to operate above 10kV, is crucial for reducing the cost of PE in the above-mentioned applications. The material properties of SiC, clearly superior to those of Si, will lead to enhanced power devices with much better performance than conventional Si devices. However, today´s SiC PE performs rather poorly compared to the predictions and the production costs are by far too high.

Pooling world-leading manufacturers and researchers, SPEED aims at a breakthrough in SiC technology along the whole supply chain:

- Growth of SiC substrates and epitaxial-layers.
- Fabrication of power devices in the 1.7/>10kV range.
- Packaging and reliability testing.
- SiC-based highly efficient power conversion cells.
- Real-life applications and field-tests in close cooperation with two market-leading manu¬facturers of high-voltage (HV) devices.

Known and new methodologies will be adapted to SiC devices and optimized to make them a practical reality. The main targets are cost-savings and superior power quality using more efficient power converters that exploit the reduced power losses of SiC. To this end, suitable SiC substrates, epitaxial-layers, and HV devices shall be developed and eventually be implemented in two demonstrators:

- A cost-efficient solid-state transformer to support advanced grid smartness and power quality.
- A windmill power converter with improved capabilities for generating AC and DC power.

PROJECT PARTNERS

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