

The MICROTECH_FOR_GREEN Project

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The project “Micro_Tech_for_Green” is centered on power transistors and sensors and their applications in the field of green energy and renewables, aiming at TRL of 6-7. Moreover, to prepare the next generation of semiconductor devices for microelectronics, two additional smaller activities aiming at a TRL of 3-4, on neuromorphic computing and on quantum sensors, will be performed. In particular, the project aims at developing new microelectronics-based technologies in four key areas:

1. Power and Sensor devices
2. Application to Renewables and Agrivoltaics
3. Neuromorphic computing
4. Technologies for Quantum Sensors

The first two areas will be focused on a number of enabling microelectronic technologies for new components (discrete power transistors, power ICs, sensors). The test ground of such new technologies will be advanced photovoltaics, in particular bifacial photovoltaics and agrivoltaics.

Expected key innovations will be on the following aspects:

- Gate oxides for SiC Transistors, dopant activation, metal ohmic contact formation;
- ALD gate dielectrics for GaN transistors, formation of the AlGaN/GaN heterostructure, GaN epitaxy;
- module level power electronics for Bifacial Photovoltaics with possible use of novel GaN or SiC FETs
- Biodegradable/compostable sensors for precision agriculture using low-cost, scalable and eco-friendly processes;
- sensors for real-time monitoring of cultivated fields;
- Quantum sensor realized by using color centers in SiC

We believe that most of the above mentioned areas of research and development are of interest for the semiconductor industry in Italy and Europe involved in the IPCEI-ME-CT initiative, and suitable for spill-over towards other industrial sectors, e.g. photovoltaics, environmental control, green deal initiative, etc. We will make a great effort to pursue this goal.