



High performant Wide Band Gap Power Electronics for Reliable, energy efficient drivetrains and Optimization through Multi-physics simulation

The European and global automotive industry currently faces the challenge of reducing CO₂ emissions, since improving air quality and avoiding global warming is high priority on the agendas in Europe and in the rest of the world. With a share of approximately 23%, the transportation system in Europe contributes significantly to the total greenhouse gas emissions and global warming. By a tremendous increase of affordable and efficient electric and hybrid vehicles, Europe can pave the way for a decarbonized transport system. Nevertheless, this is only one of many important measures that are needed to fight global warming.

The project HiPERFORM – a Research and Innovation Action funded by the ECSEL Joint Undertaking – will directly address this topic with the introduction of wide band-gap power electronics in the drivetrain of electric vehicles. 31 partners from 8 European countries are cooperating in this 3-year project with a total budget of 41 M€. The project started on May 1st, 2018.

Technical Innovation

HiPERFORM will deal with all areas of Gallium Nitride (GaN) power electronics (from base materials to complete subsystems), with a special focus on the enhancement of reliability and applications with lower voltage, like 48V systems. Since a broad community worldwide is undertaking research activities in the area of GaN, investments in research for GaN devices are key to secure innovations and patents. In addition, latest Silicon Carbide (SiC) components will be introduced into new architectures, controllers, and applications for advanced inverter systems in high power drivetrains and test systems to reduce the energy losses and reduce the components weight and size of modern EV-drivetrains.

The core objectives of the project can be summarized as follows:

1. Long term cost reduction for SiC and GaN switches
2. Wide Band Gap switches with up to 500 kHz and energy efficiency up to 98%
3. Power electronics subsystems with 40% less spatial volume

Next generation of green vehicles

The expected project results will enable the European manufactures of WBG-based electric vehicle components, charging devices and test systems to deliver excellent technologies for the automotive industry, in order to develop next generation affordable green vehicles.

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