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New European Project on Disruptive GaN Power Electronics Applications

The global demand for electricity has significantly grown over the last decades, and a further 57% increase is expected within 2050. Hence, efficient power conversion systems have become the heart of the worldwide efforts for energy transition and a green economy, since they can minimize losses and save energy, contributing to a reduction in the emission of CO_2. Wide band gap semiconductors, such as **Gallium Nitride (GaN),** have outstanding properties enabling system designers to operate them at higher voltages, temperatures, and switching frequencies, with larger efficiency gains with respect to the traditional Silicon devices. Hence, a pervasive use of GaN electronics will open wide the road to the development of close-to-zero-loss conversion systems.

In this scenario, the three-year European project **GaN4AP** **(Gallium Nitride for Advanced Power Applications)**, funded in the framework of the EU call H2020-ECSEL-2020-1-IA, was launched in June 2021 by the former ECSEL JU, now KDT-JU, the Public-Private Partnership keeping Europe at the forefront of technology development.

GaN4AP links private companies, universities, and public research institutes working in the field of GaN materials, devices, and related applications. The Consortium is composed of **36 members from 6 different European countries.**

The GaN4AP project has the ambitious target of making **GaN-based electronics** one of the main components in a large spectrum of **power converter systems**, with the possibility of drastically cutting energy losses in power electronic systems, while ensuring high-frequency and higher power density operation. Thank to this joint effort a large variety of applications will benefit from a boost in performance, without sacrificing the system size and cost.

To achieve this goal, GaN4AP will push the boundaries of GaN-based technology by studying: (i) Power conversion systems based on **state-of-the-art GaN-based HEMTs**; (ii) **Novel AlScN materials** for high-current and high-power HEMTs; (iii) New generation of **vertical power devices based on bulk GaN**; (iv) **Intelligent and integrated GaN power converters** solutions for e-Mobility. A large reliability and robustness assessment at system level will also be carried out to demonstrate the applicability of these systems in the automotive and industrial sectors.

The development of new device technologies and innovative power circuit topologies within GaN4AP will be a crucial factor to enhance the **competitiveness of EU industries** in the field of power electronics at a worldwide level.