Innovate UK

Results of Competition: EUREKA: Micro and Nano-Electronics Enabled Systems and Applications

Competition Code: 1905_EUREKA_PENTA

Total available funding is £2m

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
CAMBRIDGE GAN DEVICES LIMITED	GaNext - Next Generation GaN Power Module	£512,044	£358,431
COMPOUND SEMICONDUCTOR APPLICATIONS CATAPULT LIMITED		£257,688	£257,688
LYRA ELECTRONICS LIMITED		£340,979	£238,685

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Gallium Nitride (GaN) is arguably the most promising material to replace silicon in power electronics applications in the 650V market sector. This sector is worth multi-billion with applications ranging from power supplies, power factor correction, AC-DC converters, wireless charging to inverters in electric vehicles. Power systems based on GaN are lighter, more compact, significantly more efficient and potentially cheaper than those based on silicon. But the high switching speed and low gate voltage of state-of-the-art GaN-devices make them challenging to use. The aim of the project 'GaNext' is to remove the barriers to adoption for GaN and fully demonstrate the higher efficiency and compactness of GaN-based systems in a range of power systems. The heart of the project is the development of an intelligent GaN power module where the drive, the voltage-control and the protection circuits are integrated or co-packaged with the power device. The intelligent power module will fundamentally improve the key issues of today's GaN-based circuits. First, end users currently lose part of the advantages of GaN since it is required to slow down the switching speed to avoid high-frequency oscillations. However, these oscillations can be drastically reduced by integrating part of the passive components into the module and the reduction of EMI at the origin. Second, the tailored design of the GaNext gate driver and the intimate integration in addition to the integration of auxiliary devices on the GaN-IC will minimise any gate voltage distortions. Further, the full potential of GaN is unlocked by adding the high-speed control-IC with sophisticated safety-features, in addition to applying an advanced heat-extraction. In order to achieve these ambitious goals, the consortium is working in four main areas. 1\. GaN-on-Si power IC (650V) with integrated sensing and driving elements. 2\. Si and GaN low-voltage logic, control and level-shift SOI gate drive circuitry. 3\. Manufacture a dedicated package for the power module that will include the GaN power transistor and the control and drive circuitry. 4\. Demonstrate competitive advantage of the power module in power systems such as EV charger, lighting, drives and PV inverter; featuring optimised magnetic components. The GaNext consortium is a well-balanced mix of industrial and academic entities -- Signify, Besi, Neways and TU Eindhoven (Netherlands), Infineon, IMG Nordhausen, advICo, Sumida, TU Dortmund and Fraunhofer IMS (Germany), Cambridge GaN Devices, Lyra Electronics and Compound Semiconductor Applications Catapult (UK).