InRel-NPower

Project ID: 720527
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H2020-EU.2.1.3. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Advanced materials

Innovative Reliable Nitride based Power Devices and Applications

From 2017-01-01 **to** 2019-12-31, ongoing project

Project details

Total cost:	**Topic(s):**
EUR 7 691 466,25	NMBP-02-2016 - Advanced Materials for Power Electronics based on wide bandgap semiconductor devices technology
EU contribution:	**Call for proposal:**
EUR 7 190 000	H2020-NMBP-2016-two-stage See other projects for this call
Coordinated in:	**Funding scheme:**
Italy	RIA - Research and Innovation action

Objective

The main objective of this proposal is to develop reliable GaN-based power devices and systems for high and medium power electronics targeting industrial and automotive applications and bringing the GaN power devices another step towards the wide usability in the energy saving environment to further tap the full potential which this new material brings along.
This proposal addresses two subjects, one of which is medium power (till 10kW) GaN-on-Si based lateral HEMT structures, with special focus on high reliability, which is still a major blocking item to allow wide-spread market adoption. Hence, the impact of the GaN material quality, in combination with the device layout in view of long-term reliability will be addressed. The project aims an in-depth reliability study and qualification strategy development whereby the study of the impact of dislocations and other structural disturbances inside the materials on the long term device reliability will be specifically addressed. In addition, this proposal aims to demonstrate new device concepts with increased robustness and reliability, which will be realized, evaluated and tested thoroughly. This will demonstrate how it is possible to overcome the known limitations of the GaN on Silicon technology, like e.g. the vertical leakage, trapping phenomena and/or breakdown of lateral HEMTs. The current proposal also contains the development of novel device architecture (dual channel, substrate removal, e-mode), as well as the exploration of new material systems (Aluminum Nitride (Al-based) devices) which can also largely contribute to overcome drawbacks of the GaN on Si technology. The applicability of the novel GaN-on-Si concepts in form of an industrial inverter will be demonstrated finally, with the development of an innovative low inductance packaging system for power devices, making full benefits of the fast switching capability of GaN-based power devices.

Coordinator

Università degli Studi di Padova
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Italy

EU contribution: EUR 650 000

Activity type: Higher or Secondary Education Establishments

Participants

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Activity type: Private for-profit entities (excluding Higher or Secondary Education Establishments)

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Activity type: Research Organisations

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EU contribution: EUR 950 000

Activity type: Private for-profit entities (excluding Higher or Secondary Education Establishments)

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EU contribution: EUR 626 165

Activity type: Research Organisations

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Activity type: Private for-profit entities (excluding Higher or Secondary Education Establishments)

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EU contribution: EUR 744 980

Activity type: Private for-profit entities (excluding Higher or Secondary Education Establishments)

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EU contribution: EUR 1 825 271,25

Activity type: Private for-profit entities (excluding Higher or Secondary Education Establishments)

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EU contribution: EUR 505 000

Activity type: Higher or Secondary Education Establishments

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EU contribution: EUR 0

Activity type: Higher or Secondary Education Establishments

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EU contribution: EUR 0

Activity type: Higher or Secondary Education Establishments

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