



AddMorePower

ADVANCED MODELLING AND CHARACTERIZATION FOR POWER SEMICONDUCTOR MATERIALS AND TECHNOLOGIES

FOSTERING A MORE RESILIENT
POWER ELECTRONIC INDUSTRY

Welcome to our AddMorePower Newsletter!

The intention of this newsletter is to open a new communication channel to provide news on the project progress and to discuss ongoing topics relevant to AddMorePower. This newsletter is intended for internal and external project partners, stakeholders and all other interested bodies. For more detailed information about the project, we invite you to visit our project website, which is constantly updated with the latest project related news: addmorepower.eu

Message from the Coordinator

"Dear AddMorePower team,

Six months already passed quickly in our project, and we are moving forward to leave the set-up phase behind us and enter the working phase. AddMorePower is hiring and our team is growing and getting even stronger than before. This is nice to see, and I am very happy to be a part of this process! The work packages have started to tackle their technical tasks and the time is there to intensify the work, communication, and cooperation to realize our ambitious goals. I also advertised AddMorePower in the recent months and got only positive feedback and big interest from industry and academia. This tells us that we are at the right topics at the right time! We can really make a difference and create impact! Therefore, I am very much looking forward to the interesting and intense next months and years in working together in AddMorePower and spreading our topics to the stakeholders and communities. Let's get going!" André Clausner



NEWSLETTER

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addmorepower.eu



@AddMorePower_HE



[addmorepower-horizon](https://addmorepower-horizon.eu)

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Coordination
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Budget

€ 5.9 Million

100% EU-funded



Consortium

10 Partners

5 countries



Duration

48 Months

01/2023 - 12/2026

About AddMorePower

AddMorePower aims to advance X-ray and electron-probe related characterization techniques as well as modelling approaches for new wide bandgap power semiconductor materials, 3D integrated power technologies and the correlated modelling workflows.

Our focus is:

- Novel X-ray and electron-probe-based characterisation workflows and protocols for power semi-conductor materials
- Modelling concepts for better characterization and life-time prediction of power semiconductor interconnect materials
- Establish FAIR and open data practices to enable efficient data workflows between characterization and modelling techniques

Aim of the project

The wide impact of AddMorePower will broaden and accelerate market penetration of power electronics needed for the green transition, promote material integration and -development of

European power semiconductor technologies, and provide new opportunities for other industries based on micro-structured mono- and polycrystalline based industries materials.

Start of the project

The project successfully started with a kick-off meeting in January 2023 in Dresden, Germany. The event was hosted by Fraunhofer IKTS, the coordinator of the project, and supported by Technikon. The main purpose was verifying plans, engaging interaction and networking between members to build the founda-

tion for further collaboration. Monthly technical progress calls are set up to share project progress, address challenges and work toward common project goals. Within the different work packages there is specific regular meetings, e.g. on GaN sample requirements.

Project status after six months

In the first six months all work progressed according to plan.

We have made technical progress in all AddMorePower work packages.

Work Package 2: Data management and workflows

The main objective is laying the ground for FAIR data management and open science practices to enable open knowledge transfer between research facilities. During the first 6 months, a first version of the Add More Power data management plan was generated. The NOMAD repository was selected as a suitable platform to share processed characterization and modelling

data generated within the project with the public. Moreover, the first draft for an AddMorePower data policy has been written. In the following months WP2 will focus on finalizing the data policy, evaluating the NOMAD repository for our daily use and start working on ontologies.

Work Package 3: Advanced X-ray-based characterization methods

Work in WP 3 concerned essentially the identification of suited test structure ("polyheater") geometries for investigation of metallization fatigue. These issues concern mainly the metal contacts and their degradation during device operation. The exchanges ensured mutual compatibility of sample preparation requirements between lab based XRM and synchrotron based dark field microscopy.

Concerning X-ray imaging of active device layers, various geo-

metries of AlGaIn/GaN layers were identified as suitable for experiments. After extensive exchange about the questions to be addressed in the devices and the potential of synchrotron based x-ray methods, a first review of the capabilities currently available at the ESRF has been done, aiming at diffraction imaging of defects under operation voltages up to 600V. The ultimate goal is to image the appearance of defects and their migration inside the active semiconductor layer.

Work Package 4: Advanced electron-based methods

Initial ECCI trials on the Apreo2S microscope at consortium member KAI were performed. The trials focused on testing the influence of SEM settings, which will help optimize the imaging

process. On-site ECCI training at IKTS and KAI was conducted by Prof. Guitton from consortium partner UL-LEM3.

Work Package 5: Microstructure dependent multiscale and multiphysics modelling

Detailed discussions on the causes and manifestations of thermomechanical failure in Cu strips in polyheaters are ongoing, first ECC profiles for parallel dislocation configurations have been created and we will initially focus on the effect of pre-annealing of polyheater test structures. In addition, training on

DAMASK has begun in preparation for implementation of the impurity and vacancy diffusion models. Regarding the modelling of electron channeling contrast in the SEM, and the activities towards inverse ECCI, first ECC profiles for parallel dislocation configurations have been created.

Work Package 6: Demonstration and validation

Information on the relevance of GaN crystal defects and particularities of the EPI growth process for GaN wafers has been shared among the partners of the consortium. Exchanges and discussions on specimen requirements for laboratory-based XCT, as well as synchrotron- and TEM experiments, are underway, as is

the preparation of relevant use-case samples. Also, the state of knowledge on electro-chemically deposited thick copper films and their integration in power semiconductor devices was presented, and experimental setups as well as modelling strategies to investigate ageing mechanisms have been discussed.

Collaborations and activities

AddMorePower was a part of:

- **Cooperation with the other EU projects** in our call RES-01-19 by having an introduction meeting and aligning the project goals.
- **The European Materials Modelling Council (EMMC 2023)** international workshop, where Olivia Pfeiler (KAI, Austria) presented AddMorePower project.

On the rise

We are happy to share what is on our agenda:

Technical Meeting

where the progress of all work packages will be shared with the consortium, hosted by Infineon IFAT
@ Villach / Austria
04. - 05. July 2023

All past and upcoming events can be found on the AddMorePower official website: addmorepower.eu/events/

AddMorePower Consortium

The AddMorePower consortium consists of ten highly qualified partners from five countries (Germany, Austria, France, Czech Republic and Belgium). Among them are four highly innovative research centres, a large internationally recognized industry partner for material and component production, an industrial

competence center, two large research-based universities and two highly skilled multicultural SMEs.

The AddMorePower consortium represents a diverse pool of skills and competencies to address and solve the industry's many challenges.



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