

PRESS RELEASE

PRESS RELEASEDecember 17, 2020 || page 1 | 3

Fraunhofer ENAS honors the development of highly accurate lifetime models in power electronics with the Fraunhofer ENAS Research Award 2020

Increasing demands on the reliability of power electronics but at the same time growing reliability risks due to the high complexity of the devices make highly accurate lifetime models and improved reliability methods for the development of these power electronics components necessary. Dr. Alexander Otto from the Fraunhofer Institute for Electronic Nano Systems ENAS has successfully developed methods and models for these requirements and has now been awarded the Fraunhofer ENAS Research Award 2020 for his work.

The Fraunhofer Institute for Electronic Nano Systems ENAS annually awards the Fraunhofer ENAS Research Award for outstanding scientific results with high application relevance. This year the prize goes to the electrical engineer Dr.-Ing. Alexander Otto. He receives the award for his research work on novel approaches to lifetime modeling with a focus on power electronics components. He has succeeded in making the transition from purely load-based models to stress- and failure-effect-based approaches for service life prediction. For practical applications in the industrial environment, this will mean a significant increase in prediction accuracy in the future. Power electronics are used in the field of renewable energies, electromobility and Industry 4.0. In this context, the requirements for reliability assessments of power electronics are increasing more and more as components and functional materials become more complex, require more power density and functional integration, electronics are used in harsher environmental conditions, and functional safety must be ensured, e.g., for autonomous driving.

Editors

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Person in charge – Fraunhofer ENAS Research Award

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Person in charge – scientific topic

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FRAUNHOFER INSTITUTE FOR ELECTRONIC NANO SYSTEMS ENAS

The 36-year-old Alexander Otto studied electrical engineering at Chemnitz University of Technology, specializing in electronics/microelectronics. After his diploma in electrical engineering he transferred to Fraunhofer ENAS, where he became head of the group »Life Cycle Testing and Modeling« in the department »Micro Materials Center« in 2018. In 2020, he received his doctorate (Dr.-Ing.) from the Faculty of Electrical Engineering and Information Technology at Chemnitz University of Technology with the thesis »Lifetime modeling of discrete power electronics devices considering superimposed load cycling tests«. With his work, Alexander Otto opened up a new field of research for the institute that is embedded in the activities of the business units »Technologies and Systems for Smart Power and Mobility« and »Technologies and Systems for Smart Production« of Fraunhofer ENAS. The results have already been successfully exploited in numerous research projects and have gained international visibility in numerous publications. Through his participation in the ZVEI working groups »Power Electronics« and »High Temperature Electronics«, Alexander Otto also contributes to the development of standards and to the research roadmap of the German government.

PRESS RELEASE

December 17, 2020 || page 2 | 3



The new institute director of Fraunhofer ENAS, Prof. Dr. Harald Kuhn (center), together with the jury chair, Prof. Dr. Karla Hiller (right), awarded the Fraunhofer ENAS Research Award 2020 to Dr. Alexander Otto (left) for his outstanding scientific achievements in the field of micro- and nanotechnologies on December 17, 2020.

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The **Fraunhofer Institute for Electronic Nano Systems ENAS** is the specialist and development partner in the field of Smart Systems and their integration for various applications. Fraunhofer ENAS has specialized on the challenge of combining micro and nano sensors, actuators and electronic components with interfaces for communication and a self-sufficient energy supply to form smart systems, thus supporting the Internet of Things and the ongoing digitalization. The institute develops single components, manufacturing technologies and system concepts, system integration technologies and actively supports the technology transfer for and with its customers. It offers innovation consulting and supports customer projects, starting from the idea, via design and technology development or realization based on established technologies up to tested prototypes.

FRAUNHOFER INSTITUTE FOR ELECTRONIC NANO SYSTEMS ENAS

Since 2011, the Fraunhofer ENAS Research Award has been presented once a year by the Fraunhofer Institute for Electronic Nano Systems ENAS in Chemnitz for outstanding scientific results with high application relevance in the field of micro and nano-technologies and is endowed with 5,000 euros. This year, the award ceremony took place as a virtual event for the first time. As part of the online award ceremony, the award winner presented his research work. Dr. Oliver Pyper, Director Research Development Innovation Programs at Infineon Technologies Dresden GmbH & Co. KG., held the laudation. Afterward, the institute invited to a panel discussion on the topic »Generating added value for both industry and research under the existing pressure to innovate«. Prof. Dr. Harald Kuhn, the director of Fraunhofer ENAS, talks about this question with the laudator Dr. Oliver Pyper and the other participants Dr. Steffen Heinz (Managing Director of EDC Electronic Design Chemnitz GmbH), Barbara Meyer (Head of Department Industry, SMEs and Innovation, Saxon State Ministry of Economics, Labor and Transport), Prof. Dr. Uwe Götze (Prorector for Transfer and Continuing Education of Chemnitz University of Technology), Dr. Christiane Le Tiec (CTO of the Business Unit Plasma & Reactive Gas Solution of MKS Instruments Deutschland GmbH) and Dr. Stefan Leidich (Senior Manager Microsensors of Robert Bosch GmbH).

PRESS RELEASE

December 17, 2020 || page 3 | 3



The awardee of the Fraunhofer ENAS Research Award 2020, Dr. Alexander Otto investigates in highly accurate lifetime models in power electronics.

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The **Fraunhofer-Gesellschaft**, headquartered in Germany, is the world's leading applied research organization. With its focus on developing key technologies that are vital for the future and enabling the commercial exploitation of this work by business and industry, Fraunhofer plays a central role in the innovation process. As a pioneer and catalyst for groundbreaking developments and scientific excellence, Fraunhofer helps shape society now and in the future. Founded in 1949, the Fraunhofer-Gesellschaft currently operates 74 institutes and research institutions throughout Germany. The majority of the organization's 28,000 employees are qualified scientists and engineers, who work with an annual research budget of 2.8 billion euros. Of this sum, 2.3 billion euros is generated through contract research.