ELECTRIFICATION & POWER SEMICONDUCTORS

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Biography
Uwe Hansen received his PhD in Physics at the Technical University from Munich. He specialized in theoretical semiconductor physics. Uwe started his career at Bosch as a process engineer in the Bosch automotive Waferfab, held various functions within Bosch related to semiconductors and was responsible for advanced packaging for CE and automotive MEMS. Since 2018 he is heading the department for power component and module development at Bosch.

References

TRANSFORM: Trusted European SiC Value Chain for a greener Economy

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Abstract
Power electronics systems based on wide band-gap materials play an essential role in future power conditioning and conversion systems. Among these SiC is at the forefront due to its advantages in efficiency and thermal behavior. The EU funded innovation project TRANSFORM demonstrates a complete European SiC based power electronics value chain. 32 partners from industry and academia cover materials, processing equipment, devices, power modules and systems to build up this value chain in essential application domains such as e-mobility, industry, agriculture, and renewable energy. Power MOSFETs are processed in series production lines on advanced SiC substrates. They are benchmarked to standard mono-SiC substrates in aspects of defectivity and processability. Device characteristics are compared to those on standard wafers and devices are used in real applications in various demonstrators. While showing some processing challenges, devices on advanced substrates have shown superior behavior in terms of RDSON, reverse recovery charge and bipolar degradation. Power modules with copper-based assembly and interconnection technologies, i.e. copper bonding on copper metallized SiC with copper sinter paste, are developed showing very promising reliability data. High density power modules as well as new manufacturing approaches are developed that improve thermal and electrical performance. An innovative current source gate driver is developed that enables gate shaping and in-system parameter identification to ensure optimal utilization of single as well as parallel connected power switches. Highest performance at lowest possible cost along the entire lifetime is maintained by taking degradation of power switches and interconnects into account. The innovative technologies are showcased in five demonstrators in above

mentioned application domains. This project has received funding from the Key Digital Technologies Joint Undertaking (KDT JU) under Grant Agreement No101007237. The JU receives support from the European Union's Horizon 2020 research and innovation program and Germany, France, Italy, Sweden, Austria, Czech Republic, Spain.

Biography

Metin Koyuncu joined Bosch in 2001 as an electronics packaging engineer. He has been active in the field of assembly and interconnection technologies for signal and power packages for automotive and photovoltaics, flexible electronics and molded interconnect devices. Currently he is working as a project manager in the power semiconductors and modules unit of Bosch in Reutlingen, active in publicly funded projects. He is the project coordinator of "TRANSFORM" funded by the KDT-JU.

References

SiC Technology – Transfer to 200mm Wafer Size

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Abstract
Silicon carbide (SiC) technology has proven to be advantageous compared to silicon technology for high power applications like automotive traction inverters. While the electrification of modern vehicles pushes the maturity of SiC technology, several quality issues associated with the new material system have been discovered and must be tackled to maintain a low level of devices failures during operation.
Within this decade, SiC technology will make an important step: The step from 150 mm wafer size to 200 mm wafer size. While this transfer exhibits several advantages, e.g. better process stability and uniformity due to the more modern processing equipment, maintaining the same quality of the products has to be ensured. This talk focuses on the benefits and challenges of the transfer from 150 mm to 200 mm wafer size of SiC technology.

Biography
Stephan Schwaiger studied physics at the university of Hamburg and finished with a doctorate degree in 2012. He started in semiconductor industry in Bosch's central research department working power semiconductors. Since 2015 he works on the development of SiC semiconductors for the section Automotive Electronics at Bosch focusing on technology and device development.

References