Cultivating a Thriving SiC Market

Turbocharged Transistors: Silicon Carbide Shifting to Next Gear

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In the context of global megatrends – including the climate crisis, the impact of AI on various industries, and global decoupling – the demand for high-performing, efficient, and reliable power electronics remains substantial. Silicon carbide-based power semiconductors offer technical advantages over traditional silicon-based solutions. The automotive sector is expected to drive significant market growth. However, in specific applications, other substrates like Si, GaN, or ultra-wide bandgap materials may remain relevant or take precedence. To foster a fast-growing and sustainable SiC market, addressing three key challenges in product development, process optimization, and raw material supply chain management will be essential for the entire value chain.

Biography

Since 2019: Porsche Consulting Germany and France Manager with competence focus semiconductor technology, product strategy and development, product cost optimization, design to cost, cost reduction and profitability programs.

References

Challenges in Scaling SiC Power Chip Manufacturing: A Material Supplier's Perspective

M. Puttock
Sr. Director
Entegris GmbH, Office of CTO, Dresden, Germany

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The era of SiC-based power chips has undeniably begun. Factories are producing substrates and chips to meet current demand, but given that these chips aim to improve end-use efficiency, is the manufacturing process of SiC chips itself running efficiently?

The answer is, not yet. But that should not be surprizing as high volumes have not been running for long enough for teething problems to be solved. Here we will touch on some of the areas where SiC material properties present the chip makers with challenges. These challenges are at varying levels of resolution and will no doubt be solved in time. This resolution will enable SiC power chips to take its predicted place in the future eco system.

Our examples shown are based on Entegris's view which is determined by our particular contact points. So, this may not be an exhaustive list. What we see are challenges relating to:

1. CMP (Chemical Mechanical Planarization): SiC is harder than Si.
2. Handling: SiC is more brittle than Si.
3. Implantation: SiC is more difficult to implant than Si.
4. Thermal processing for wafer growing and epi processes: SiC processes are hotter than Si.

For each of these areas, we will provide insights and considerations, highlighting the path toward achieving efficient, high-volume SiC power chip manufacturing.

Biography

Mark has worked in the semiconductor industry for over 30 years with a background in Physics and Plasma processing. From 2014, as a team member of the Entegris CTO office, Mark follows technology trends and collaborates with Entegris' global product development teams to develop timely and differentiated new materials and components for the world's leading semiconductor manufacturers.

References

Panelist

A. Blum
Project Manager, Progressive Semiconductor Program
Volkswagen Group Components, Ingolstadt, Germany

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Biography
Dr. André Blum joint Audi in 2004, starting as a developer for EMC capabilities of ECUs. In 2008 he finished his PhD work in electrical engineering (power electronics). In the following years he managed several projects and small teams in different production departments. Since the beginning of 2016 Dr. Blum is a team member of the Audi Semiconductor Strategy and VW Group OneTeam and works with semiconductor companies on a daily basis. Dr. Blum was promoted to Audi Management in 2015. Based on his long history within Audi, working in the product development as well as in the production & logistics and production planning divisions, Dr. Blum is an expert in automotive electronics as well as in industry 4.0 electronics.

References

Panelist

R. Bornefeld
Sr. Vice President of Business Line and
Engineering Power Semiconductors and Modules
Robert Bosch GmbH, Reutlingen, Germany

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Biography
Ralf Bornefeld is Senior Vice President with responsibility for business line and engineering of Power Semiconductors & Modules at Bosch. He joined Bosch in November 2019.Before he held various management positions at Infineon Technologies AG: senior director technology in frontend production from 2005-2008, senior director engineering of automotive sensors until 2011 and finally vice president and general manager business line automotive sensors.Ralf started his career at Elmos Semiconductor in 1992 as a technology development engineer. Afterwards he took several management positions until end of 2004, mostly serving as vice president of R&D and eventually as vice president of business line microsystems.Ralf Bornefeld was born in Schalksmuehle, Germany, in 1964. He graduated with a degree in Electrical Engineering from Technical University of Dortmund in 1992.

References

Panelist

E. Sabonnadière
Sr. Vice-President of the Division Automotive & Industrial
Soitec, Grenoble, France

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Biography
Since July 2021, Mr Sabonnadiere is Senior Vice-President of the Division Automotive & Industrial ofSoitec. He is also in charge of the Strategic Program SiC.From September 2017 to July 2021, Mr Sabonnadiere was CEO of CEA-Leti, one of the mostinnovative Labs in the industry of microelectronics and biotechnology, based in Grenoble (France).Previous two years, Mr Sabonnadiere was CEO & Chairman of the Business Group Professional ofSignify, former Philips Lighting (Amsterdam). From 2014 till 2016, he served as Senior Associate ofMidCap Private Equity firm named Gimv (Paris, Antwerpen, Munich, Den Haag).Previously in his career, Mr Sabonnadiere was CEO & Chairman of General Cable Europe & Africa(Barcelona). From 2005 till 2008, he was CEO of NKM Noell Gmbh, the German branch of the groupREEL. Mr Sabonnadiere was vice-president of the Distribution Transformers division of Alstom T&Dfor 5 years. He began his career in 1992 with Schneider Electric holding various positions includingthat of Managing Director of equipment units for 10 years.Mr Sabonnadiere has a strong innovation and technological background combined with a successfulbusiness track record over decades and some key innovations adopted into the markets. With 30+years of executive leadership of large operations, he produced high level performances of operatingmargins & results and generation of cashflow. He gained a sound experience of change managementin large multi-cultural organizations to adapt to new markets conditions and dynamics in European andInternational environments. He designed and set-up ambitious strategic plans including some merge &acquisitions.Mr Sabonnadiere believes in operational excellence, innovations in technology, talents managementand enthusiasm in leadership. His sound experience in the European industry make him a highlyknowledgeable and respectful Board member.Mr Sabonnadiere obtained a PhD in physics (France), and an engineering degree in InformationTechnology (France). He holds an MBA (France)Mr Sabonnadière is a fully qualified instructor at the ski school in Les Ménuires, and member of theAdvisory board of IAC Consultant and Sparring Capital firm.

References