



FOR IMMEDIATE RELEASE:

New applications are driving materials & design innovations for power module packaging

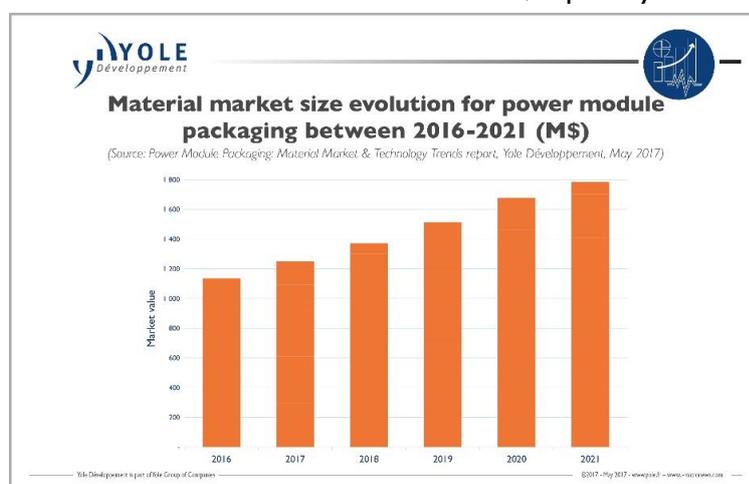
Power Module Packaging: Material Market and Technology Trends 2017 report – Yole Développement

LYON, France – May 16, 2017: The power packaging materials is today the main part of the power module cost. Therefore, in 2016 almost 40% of the total cost is due to the cost of materials for packaging. “To understand the evolution of the power packaging market, it is now essential to look in details the selected materials and design and evaluate each innovation”, comments **Mattin Grao Txapartegi, Technology & Market Analyst, Power Electronics at [Yole Développement \(Yole\)](#)**, part of Yole Group of Companies¹.

Yole, “The More than Moore” market research & strategy consulting company releases this month its new Power Module Packaging report titled: [Power Module Packaging: Material Market and Technology Trends 2017](#). Aim of this technology & market report is to the state of the art of the power module packaging. With a strong focus on designs and materials, Yole’s analysts propose a deep understanding of the current technical challenges and market evolution. Identification of the key technologies that will shape the future, analysis of the supply chain with key players... are part of this new report.

According to Yole, the power module materials market will grow at 9.5% per year between 2016 and 2021, reaching almost US\$1.8 billion in 2021. How new applications will drive the growth of power electronics, especially with innovative materials and designs? Yole’s

analysts offer you today a snapshot of this study.



In 2016, the power module market was worth almost US\$3.2 billion and from there it will grow steadily for the next five years.

A large part of the power module cost is dedicated to raw materials for packaging: indeed materials for die-attach, substrate-attach, substrate, baseplate, encapsulation, interconnections and casings already

¹ Yole Group of companies includes Yole Développement, System Plus Consulting, KnowMade, PISEO and Blumorpho.

constitute a US\$1.1 billion market in 2016 and Yole announces a steady growth until 2021.

Yet the growth will not be even across all raw material markets. Die-attach materials have the highest forecast CAGR² for 2016-2021, at over 13%. Casings and encapsulation have the lowest CAGR, at 5-7% for 2016-2021. The main differences arise from technology choices for those materials and their impact on the each market segment. For instance, the greater presence of epoxy resin will reduce the cost of encapsulation in power modules.

Substrates and baseplates account for half of the packaging raw material market, and together are worth over US\$550 million. Therefore, the choice of technology in ceramic substrates or baseplates can have a great impact on final power module cost. Around 25% of the cost is related to die-attach or substrate attach material. Rest of the cost is divided between encapsulation, interconnections and the casing.

Industrial applications remain the biggest part of the power module market. However, EV/HEV³ market, with its double-digit growth forecast for the period 2016-2021, will represent around 40% of this market by 2021. Moreover, the automotive industry is leading in technological innovations in packaging, helping and accelerating the implementation of these new technologies thanks to high manufacturing volumes.

“The power module market is becoming extremely competitive with several new players arriving from different directions”, asserts **Dr Milan Rosina, Senior Analyst for Energy Conversion & Emerging Materials** at Yole.



In recent years, some consolidations among power semiconductor market leaders took place, with several acquisitions, such as Infineon Technologies buying International Rectifier and ON Semiconductor buying Fairchild. These moves were intended to strengthen positions in the overall power semiconductor business.

Nevertheless, in coming years the market leaders will face strong competition from Tier-1 automotive

² CAGR : Compound Annual Growth Rate

³ EV/HEV : Electric and Hybrid cars

manufacturers such as Denso or Robert Bosch and new entrants from China such as Starpower and CRRC.

OSATs⁴ could also propose services to provide advanced packaging technologies to power module manufacturers. This will define a new business model that diverges from the traditional power module supplier business. Thereby, all companies involved in the power module market will need to adapt or rethink their offerings and especially secure their technological advances via continuous innovations...

A detailed presentation of the new Power Module Packaging: Materials Market & Technology Trends report is available on [i-micronews.com, power electronics section](http://i-micronews.com/power-electronics-section).

Yole's analysts are covering all year long the power electronics field with its technologies and applications. PCIM Europe 2017 and IWBGPEAW 2017 are part of Yole's 2017 program:

- Yole's Market Briefing at PCIM Europe 2017: Yole's presentation titled "Status of the Gate Driver industry", takes place on 05/18 (Speaker: **Jonathan Liao, Technology & Market at Yole**). To discover the program & speakers, click [Power Electronics Market Briefing](#).
- IWBGPEAW, on May 22 & 23 with a dedicated power packaging session. **Dr Hong Lin, Technology & Market Analyst at Yole** will be there to present her vision of the latest innovations focused on WBG technologies. To learn more about detailed agenda, click: [IWBGPEAW 2017](#).

⁴ OSAT : Outsourced Semiconductor Assembly and Test companies



About [Power Module Packaging: Material Market and Technology Trends 2017](#) report

How new applications drive the choice of power module materials and designs – This report has been performed by Yole Développement (Yole) part of Yole Group of Companies.

Authors:

Mattin Grao Txapartegi is a Power Electronics Analyst at Yole Développement. He is engaged in many custom studies and reports dedicated to the evolution of inverters architecture, passive components, and recently he has been in charge for the power packaging topics. Mattin is daily driving technology and market scouting, roadmap definition, disruptive technologies and market opportunities identification and competitive landscape analysis. Previously he acquired a comprehensive expertise in the design of power converters for electric vehicles at the car manufacturer Renault. He graduated from Grenoble INP with an Engineering degree in Electrical Systems. He then earned an advanced master's degree in Aeronautics Engineering from Arts et Métiers ParisTech. During this time, he oversaw managerial, financial and marketing fields within the aeronautics industry.

Dr. Milan Rosina is a Senior Analyst for Energy Conversion and Emerging Materials at Yole Développement. Before joining Yole, he worked as a Research Scientist and a Project Manager in the fields of photovoltaics, microelectronics, and LED. Dr. Rosina has more than 15 years of scientific and industrial experience with prominent research institutions, an equipment maker, and a utility company. His expertise includes new equipment and process development, due diligence, technology, and market surveys in the fields of power electronics, renewable energies, energy storage, batteries, and innovative materials and devices.

Companies cited in the report:

ABB, ACC, Alpha, AM2T, Amkor, AOS, APE, aPSI3D, Avator, AT&S, BlueStar, Silicones Bosch, BYD, CeramTec, Comelec, Continental, CPS Technologies, Danfoss, Delphi, Denso, Dow Corning, Dowa, Dupont, Dynex, Electrolube, Fuji Electric, GaN Systems, GE, General Electric, Hala, Henkel, Heraeus, Hitachi, Hitachi Chemical, Honda, Indium Corporation, Infineon, Intel, International Rectifier, KCC, Kisco Conformal Coating, Kyocera, LS, Mersen, Mitsubishi Electric, Mitsubishi Materials, Momentive, Müller-Ahlhorn, Nusil Technology, Plansee, Powerex, Powerstax, Ravelin Materials, RHP Technology, RUISIL, Schneider Electric, Semikron, ShinEtsu, Specialty Coating Systems (SCS), Shanghai Hua Hong NEC, Shin Etsu, Siemens, Starpower, STATS ChipPAC, STMicroelectronics, Texas Instruments, Toshiba, Toyota, TSMC, Valeo, Vincotech, Wacker...



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Founded in 1998, Yole Développement has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole Développement group has expanded to include more than 50 collaborators worldwide covering MEMS, Compound Semiconductors, RF Electronics, LED, Displays, Image Sensors, Optoelectronics, Microfluidics & Medical, Advanced Packaging, Manufacturing, Nanomaterials, Power Electronics and Batteries & Energy Management.

The “More than Moore” company Yole, along with its partners System Plus Consulting, PISEO, Blumorpho and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business.

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