



FOR IMMEDIATE RELEASE:

Advanced substrates, a key enabler of future advanced packaging solutions

Advanced Substrates Overview: From IC Package to Board report
– Yole Développement – February 2017

LYON, France – February 23, 2017: “Advanced substrates are the key interconnect component of advanced packaging architectures”, comments **Andrej Ivankovic, Technology & Market Analyst, Advanced Packaging & Semiconductor Manufacturing at [Yole Développement \(Yole\)](#)**. Indeed advanced substrates are critical in enabling future products and markets.

To answer to technology evolution and market needs, Yole’s advanced packaging team has established a stand-alone dedicated advanced substrate activity, focused on exploring the market and technologies of PCBs¹, package substrates and RDLs². And today, the “More than Moore” market research and strategy consulting company announces its first report titled “[Advanced Substrates Overview: From IC³ Package to Board](#)”. This technology & market analysis serves as an overview of advanced substrate technologies, markets, and supply chain, to be supported by subsequent in-depth reports.

Advanced substrates are a key enabler of future products and markets. Yole’s analysts offer you a special focus on this industry and its competitive landscape.

Today’s advanced substrates in volume are:

- FC⁴ substrates
- 2.5D/3D TSV⁵ assemblies
- And thin-film RDLs especially for FOWLP⁶ advanced packaging platform, below an L/S resolution of 15/15 um and with transition below L/S < 10/10 um.

These advanced substrates are traditionally linked to higher-end logic such as CPUs⁷/GPU⁸s, DSPs⁹, etc... Driven by ICs in the latest technology nodes in the computing, networking, mobile, and high-end consumer market segments (gaming, HD¹⁰/Smart TV).

Moreover, due to additional form factor and low power demands, WLP and advanced FC substrates are also widespread in majority of

¹ PCB : Printed Circuit Board

² RDL : Redistribution Layer

³ IC : Integrated Circuits

⁴ FC : Flip Chip

⁵ TSV : Through Silicon Via

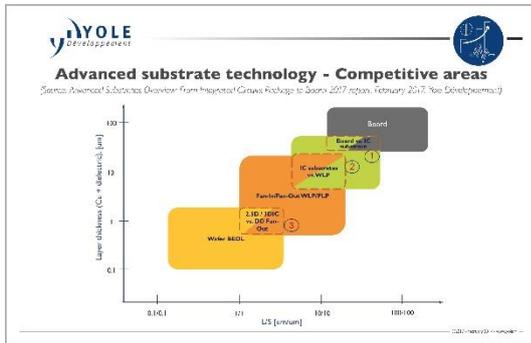
⁶ FOWLP : Fan Out Wafer Level Packaging

⁷ CPU : Computer Power User

⁸ GPU : Graphics Processing Unit

⁹ DSP : Digital Signal Processor

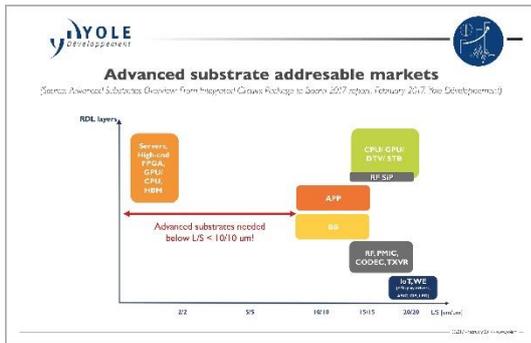
¹⁰ HD : High Definition



smartphone functions. Yole’s analysts identified: application processors, baseband, transceivers, filters, amplifiers, WiFi modules, drivers, codecs, power management, etc.

Future higher-end products will require package substrates with L/S < 10/10 µm and boards with L/S < 30/30 µm. These demands have given rise to three distinct competition areas:

- Board vs. IC substrate (See the image 1: green & grey zone)
- IC substrate vs. FOWLP (See the image 1: green & orange zone)
- FOWLP vs. 2.5D/3D packaging (See the image 1: yellow & orange zone)



The board vs. FC substrate area is characterized by the transition from the subtractive to the mSAP¹¹ process, and competition between board and substrate manufacturers. Evaluation of “substrate-like PCBs” is already under way at OEMs, and so too the potential new integration opportunities they could bring. Furthermore, developments in FC substrate, FOWLP, and 2.5D/3D packaging have created an immense competitive arena for L/S < 10/10 µm packaging, with a

large variety of solutions coming from business models across the supply chain including IDMs, foundries, OSATs, WLP houses, substrate manufacturers, and EMS.

As shown in figure 2, the transition to substrates for ICs below L/S < 10/10 µm has begun, led by application processors/basebands in FOWLP and advanced FC substrates, and the first GPUs in 2.5D/3D TSV configuration. The “below L/S < 10/10 µm” advanced substrate roadmap is open, with intense R&D underway and each manufacturer developing strategies and targets for their respective solutions....

[Yole’s advanced substrates report](#) is an overview of the technology status and market evolution. It will be followed by further in-depth reports. Today, with this first edition, the objective is to provide an overview of board, substrate and RDL interconnects, analyze the technology trends and assess future development of the advanced substrate market. A detailed description of the report is available [on i-micronews.com](http://on-i-micronews.com), [Advanced Packaging reports section](#).

The Fan-Out platform’s excitement has clearly caught the attention of the advanced packaging industry as well as advanced substrate manufacturers. Day to day, Yole’s advanced packaging team is enlarging

¹¹ mSAP process : Modified Semi-Additive Processing

its know-how to understand the technical and economic issues. Analysts are daily interacting with advanced packaging leaders to turn research results into strategies and define a long-term view of the business.

To point out its commitment towards the advanced packaging community, Yole is playing a key role within the program of the [13th International Conference and Exhibition on Device Packaging](#) (March 6-9, 2017 - Fountain Hills, Arizona USA). The consulting company announces two presentations on March 7:

- What is driving the 3D TSV technologies business?
Santosh Kumar, Sr Technology & Market Analyst, Yole
- FOWLP: market & technology trend
Jérôme Azemar, Technology & Market Analyst, Yole

As well as a panel discussion titled “The Fan-Out Breakout” moderated by Jérôme Azemar. Fan-Out is the most dynamic solution in the advanced packaging playground at the moment. Make sure you will get an up-to-date vision of the market and debate with brilliant panelists including:

- Rich Rice, Sr. VP of Business Development, ASE Global
- Islam Salama, Director, Pathfinding Department, Substrate and Packaging Technology Development at Intel
- Johannes Lodermeier, Wafer Level Technology Development Responsible, Infineon Technologies
- Vinayak Pandey, Product and Technology Marketing Director / Scott Sikorski, Product Technology Marketing Vice-President at JCET / STATS ChipPAC
- And Santosh Kumar, Sr Technology & Market Analyst, Yole

To get more information about this conference and Yole’s participation, please contact Camille Veyrier, Marketing & Communication Project Manager at Yole (veyrier@yole.fr).

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About [Advanced Substrates Overview: From IC Package to Board](#) report

How can advanced substrates and boards bridge the gap created by front-end scaling?

▪ Author:

Andrej Ivankovic is a Technology & Market Analyst on the Advanced Packaging and Semiconductor Manufacturing team at Yole Développement, the

“More than Moore” market research and strategy consulting company. Andrej holds a master’s degree in Electrical Engineering with specialization in Industrial Electronics from the University of Zagreb, Croatia, and a PhD in Mechanical Engineering from KU Leuven, Belgium. He started at ON Semiconductor, performing reliability tests, failure analysis, and characterization of power electronics and packages. He then worked for several years as an R&D engineer at IMEC Belgium on the development of 3D IC technology, focused on electrical and thermo-mechanical issues of 3D stacking and packaging. During this time he also worked at GLOBALFOUNDRIES as an external researcher. Andrej regularly presents at international conferences and has authored or co-authored >20 papers and one patent.

▪ Companies cited in the report:

3CEMS, 3 M, 3Win Group, A MD, Amkor, Amphenol, Aoshikang, Apple, AOI AT&S, ASE, Avago, Benchmark, Boardtek, Career, CCTC, Celestica, Chin Poon, ChipBond, ChipMOS, CMK, Compeq, Cosmotech, Daeduck, Deca Technologies, Dynamic, Eastern, Ellington, Ericsson, Facebook, Fast Print, Flex, Flexium, Founder, Foxconn, Fujikura, Fujitsu, Gold Circuit, Google, HannStar Board, HiSilicon, Hitachi Chemical, Huatian, Huawei, Ibsiden, Ichia, Inari Berhad, Infineon, Intel, Isu Petasys, Jabil, JCET, Juniper Networks, KCE Electronics, Kingboard, Kinsus, Kinwong, KYEC, Kyocera, Kyoden, Lenovo and many more...

About Yole Développement – www.yole.fr

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, 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, 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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