



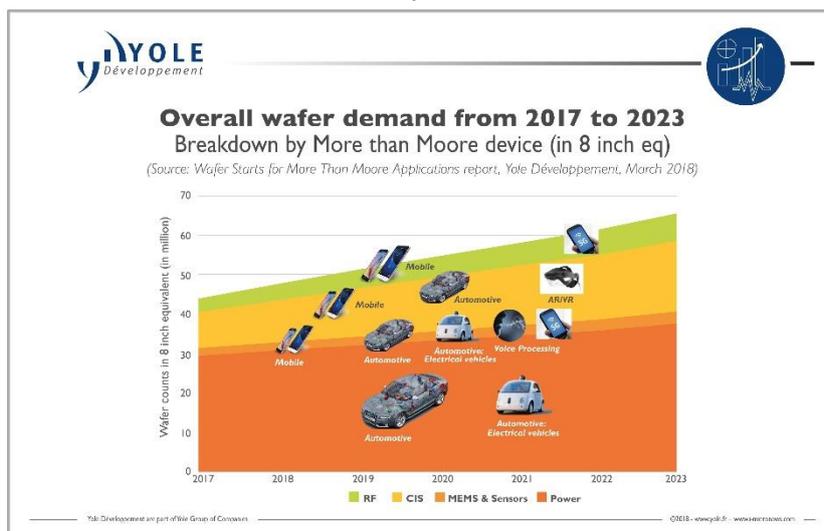
## FOR IMMEDIATE RELEASE:

### More than Moore's overall wafer demand is driven by the megatrends

Extracted from: Wafer Starts for More Than Moore Applications report, Yole Développement – Release date: March 2018

**LYON, France – March 29, 2018:** MtM<sup>1</sup> wafer demand reached almost 45 million 8-inch eq wafers in 2017. The wafer demand is expected to reach more than 66 million 8-inch eq. wafers by 2023, with an almost 10% CAGR<sup>2</sup> between 2017 and 2023. According to [Yole Développement \(Yole\)](#)'s definition, the MtM applications include MEMS<sup>3</sup> & sensors, CIS<sup>4</sup>, and power, along with RF<sup>5</sup> devices.

For the first time, the market research and strategy consulting company Yole announces a global technology & market analysis dedicated to the MtM industry. The [Wafer Starts for More Than Moore Applications report](#) is the first part of a valuable series that will be released all year long. “Yole’s analysts are part of the powerful semiconductor community”, explains **Emilie Jolivet, Director, Semiconductor and Software at Yole.** “Their daily interactions with leading companies allow them to collect a large amount of relevant data and cross their vision of market segments’ evolution and technology breakthroughs. Wafer Starts for More Than Moore Applications report is the first opportunity to get an overview of the MtM industry based on a 20-year expertise.”



“Numerous megatrend market drivers will contribute to MtM devices’ growth”, confirms **Amandine Pizzagalli, Technology & Market Analyst, Semiconductor Manufacturing at Yole.** “The megatrends are covering the following market segments: 5G including wireless infrastructure & mobile, mobile with additional functionalities,

<sup>1</sup> MtM : More than Moore

<sup>2</sup> CAGR : Compound Annual Growth Rate

<sup>3</sup> MEMS : Micro Electro Mechanical Systems

<sup>4</sup> CIS : CMOS Image Sensor

<sup>5</sup> RF : Radio Frequency

*voice processing, smart automotive, AR/VR<sup>6</sup> and AI<sup>7</sup>.”*

What is the status of the MtM wafer demand? Which market drivers will contribute to the growth of MtM devices? Which semiconductor substrate materials and wafer diameter dominate the MtM industry today? What are Yole’s expectations for the next 5 years? The analysts propose you a comprehensive analysis of the MtM wafer demand market.

Driven by the increasing deployment of renewable energy sources<sup>8</sup>, and industrial motor drives, as well as the growing EV/HEVs<sup>9</sup> industry, power devices’ wafer market size will grow at an almost 13% CAGR from 2017 to 2023. In 2017, it accounted for more than 60% of overall MtM wafer starts. According to Yole’s analysts, it will continue dominating the MtM industry.

In parallel, 5G, a hot topic today, will likely be a huge part of the MtM evolution, bringing any service to any user anywhere, but also requiring new antennas, along with filtering functionality. These stringent requirements will lead to increasing demand for RF components like RF filters, PAs<sup>10</sup>, and LNAs<sup>11</sup> to ensure access to tomorrow’s radio network.

Meanwhile, the demand for advanced mobile applications that integrate more functionalities will require aggregating more and more devices such as fingerprint sensors, ambient light sensors, 3D sensing, microphones, and inertial MEMS devices. This will, in the near future, contribute to strong wafer growth in the MEMS & sensors wafer market. Additionally, smart automobiles have reached a new level of complexity requiring the development and integration of new sensors. As such, Yole expects smart automobiles to drive consistent growth of CIS and sensor wafer production over the next five years, fueled by the expanding integration of high-value sensing modules like radar, imaging, and LiDAR. Although automotive will be mainly supported by these growth areas, classical MEMS & sensors such as MEMS pressure sensors and inertial MEMS will still continue growing at a reasonable rate, supporting the standard automotive world.



Yole’s investigations are based on numerous discussions with leading semiconductor players. Applied Materials Inc. is part of them. Amandine Pizzagalli recently had the opportunity to debate with **Mike Rosa, Head of Marketing, 200mm**

<sup>6</sup> AR/VR : Augmented Reality/ Virtual Reality

<sup>7</sup> AI : Artificial Intelligence

<sup>8</sup> Principally solar energy inverters

<sup>9</sup> EV/HEV : Electric and Hybrid Vehicle

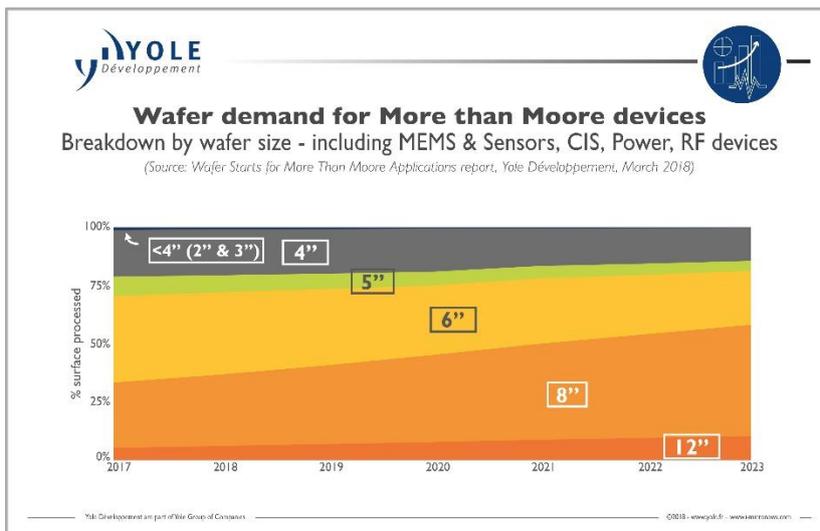
<sup>10</sup> PA : Power Amplifier

<sup>11</sup> LNA : Low-Noise Amplifier

**Equipment Products Group (EPG)** at Applied Materials. During this discussion, both exchanged their vision of the MtM industry and its evolution.

*“Today, while many of these technologies exist on 200mm and below wafer sizes much of this business falls within the purview of the 200mm Equipment Product Group”,* explains Mike Rosa from Applied Materials. *“With the exception of Power Bipolar-CMOS-DMOS (BCD) and some Discretes, 2.5D Interposer, CMOS Image Sensors and some Photonics devices in the market – all other technologies in the MtM segment are manufactured on 200mm and 150mm wafer sizes today. So, to support our customers on current and future wafer size requirements, we work across the company to share the domain knowledge acquired, for example in the 200mm group on MEMS or Discrete Power, with the 300mm group in order to ensure continuity of technology development onto the larger wafer sizes....”*

The full interview is available on [i-micronews.com](http://i-micronews.com), semiconductor manufacturing news or click [Here](#).



In terms of wafer size, the MtM wafer market is dominated by the 6-inch wafer format, followed by the 8-inch size, which is mostly supported by power device applications. However, though 6-inch will continue increasing in the next few years, its share will decrease compared to 8-inch. *“We expect 8-inch wafer diameter to progress significantly and surpass the 6-inch wafer size by 2023”,* explains Amandine

Pizzagalli from Yole. And she adds: *“This transition will be driven first by power and MEMS & sensor applications, where the vast majority will convert their components from 6-inch to 8-inch over the next five years due to increasing volume production.”*

Nevertheless, 12-inch will represent the fastest growth from 2017 to 2023, with a 15% CAGR. The 12-inch wafer demand should also grow from 3.3 million units in 2017 to 7.5 million in 2023, mainly fueled by BSI<sup>12</sup> CIS (Including 3D stacked BSI, 3D hybrid BSI).

On the other side, 4-inch wafer diameter is in large demand today for MtM applications driven by RF SAW<sup>13</sup> filter products. However, 4-inch’s adoption will decrease due to the transition from 4-inch to 6-inch for these applications. Yole still sees some MtM products

<sup>12</sup> BSI : Backside Illumination

<sup>13</sup> SAW : Surface Acoustic Wave

manufactured in wafer sizes below 4-inch, i.e. 3-inch and 2-inch wafer formats. However, these represent a very small volume, and the analysts expect such sizes to die out, aside from small volumes still used for producing MEMS, power, and RF SAW devices.

The Wafer Starts for More Than Moore Applications report is the first research performed by Yole's analysts, gathering all the wafer starts markets for MtM applications. Yole's market forecast methodology is based on both top bottom and a bottom up approach with dozens of interviews of companies across the entire semiconductor value chain. With this report, the company proposes an assessment of the wafers market for MEMS & Sensors, CIS, power and RF devices. This analysis reveals the market metrics at wafer market level for the whole MtM industry from 2017-2023. It evaluates market developments in terms of market size, substrate sizes/formats, and by MtM application. Yole's report also discloses the competitive landscape with key players in technology development and manufacturing. A detailed analysis of the key market drivers that will shape the MtM market in the future are also part of this technology & market report.

A detailed description of this report is available [on i-micronews.com,  
semiconductor manufacturing report](https://www.i-micronews.com/semiconductor-manufacturing-report).

**ABOUT THE REPORT:****WAFER STARTS FOR MORE THAN MOORE APPLICATIONS**

Driven by megatrend markets, More than Moore devices' overall wafer demand is expected to grow at an almost 10% CAGR from 2017 to 2023– Produced Yole Développement (Yole).

**Companies cited in the report:**

Alpha & Omega Semiconductor, Austriamicrosystems (AMS), Broadcom/Avago, Canon, Cavendish Kinetics, GaN Systems, Fairchild Semiconductor, Fuji Electric, Infineon, Ixys, Qualcomm/TDK Epcos, Qorvo, Microsemi, Microchip, Mitsubishi, Murata, NXP, Omnivision, On Semiconductor, Panasonic, Renesas, Samsung, Sony, Skyworks, STMicroelectronics, Texas Instruments, Toshiba, Vishay, and more... Full list

**Authors:**

**Amandine Pizzagalli** is a Technology & Market Analyst at Yole Développement (Yole). Amandine is part of the development of the Advanced Packaging & Semiconductor Manufacturing Business Unit of Yole with the production of reports and custom consulting projects. She is in charge of comprehensive analyses focused on semiconductor equipment, materials and manufacturing processes. Previously, Amandine worked as Process engineer on CVD and ALD processes for semiconductor applications at Air Liquide. Amandine was based in Japan during one year to manage these projects. Amandine is graduated in Electronics from CPE Lyon (France), with a technical expertise in Semiconductor & NanoElectronics and has a master focused on Semiconductor Manufacturing Technology, from KTH Royal Institute of Technology (Sweden). She has spoken in numerous international conferences and has authored or coauthored more than 10 papers.

*This report has been performed in collaboration with the overall business units at Yole. Analysts involved in this project include: Pierre Cambou, Dr. Alexis Debray, Dr. Hong Lin, Cédric Malaquin, Dr. Eric Mounier, Claire Troadec and Dr. Ana Villamor.*

**ABOUT YOLE DEVELOPPEMENT**

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide covering MEMS and image sensors, Compound Semiconductors, RF Electronics, Solid-state lighting, Displays, software, Optoelectronics, Microfluidics & Medical, Advanced Packaging, Manufacturing, Nanomaterials, Power Electronics and Batteries & Energy Management.

The “More than Moore” market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, PISEO and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business. . For more information, visit [www.yole.fr](http://www.yole.fr) and follow Yole on [LinkedIn](#) and [Twitter](#).

- Consulting & Financial Services: Jean-Christophe Eloy ([eloy@yole.fr](mailto:eloy@yole.fr))
- Reports: David Jourdan ([jourdan@yole.fr](mailto:jourdan@yole.fr))

Yole Group of Companies - Press Relations & Corporate Communication: Sandrine Leroy ([leroy@yole.fr](mailto:leroy@yole.fr))

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