

# Does China drive the epitaxy equipment market?<sup>1</sup>

*The epitaxy equipment market, including MOCVD, HTCVD, and MBE is key for power and optoelectronic applications. Yole announces a \$1.1 billion market in 2026.*

## OUTLINE:

- Market figures:  
Market size for MOCVD<sup>2</sup> is expected to grow to US\$630 million in 2026, at 7% CAGR<sup>3</sup><sub>2020-2026</sub>.  
HTCVD<sup>4</sup> market will reach about US\$393 million in 2026, at 9.5% CAGR<sub>2020-2026</sub>.  
MBE<sup>5</sup> equipment market value will be US\$68 million in 2026. Yole announces a 7.1% CAGR between 2020 and 2026.  
MOCVD occupies a large part on the high-volume production market. It represents more than 60% of the equipment market share in 2020 revenues.
- Technology trends:  
Choice of equipment type depends on various factors such as layer quality, growth speed, COO and material systems that can be grown.  
MOCVD and MBE equipment are mainly used for compound semiconductor materials such as GaAs<sup>6</sup>, GaN<sup>7</sup>, InP<sup>8</sup>.  
HTCVD technology is dedicated to Si<sup>9</sup> and SiC<sup>10</sup> based devices manufacturing.
- Supply chain:  
Top 3 equipment vendors are Aixtron, Veeco and AMEC.  
Those companies have 62% of market share in 2020 in epitaxy equipment for More-than-Moore space.  
HTCVD SiC market segment is mainly dominated by TEL (Japan) and in parallel, HTCVD Si epitaxy equipment market is dominated by the US leading equipment company, Applied Materials.  
On the MBE front, Riber (France) continued to be the market leader.

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<sup>1</sup> Extracted from: [Epitaxy Equipment for More than Moore report](#), Yole Développement, 2021

<sup>2</sup> MOCVD: Metal-Organic Chemical Vapor Deposition

<sup>3</sup> CAGR: Compound Annual Growth Rate

<sup>4</sup> HTCVD: High-Temperature Chemical Vapor Deposition

<sup>5</sup> MBE: Molecular Beam Epitaxy

<sup>6</sup> GaAs: Gallium Arsenide

<sup>7</sup> GaN: Gallium Nitride

<sup>8</sup> InP: Indium Phosphide

<sup>9</sup> Si: Silicon

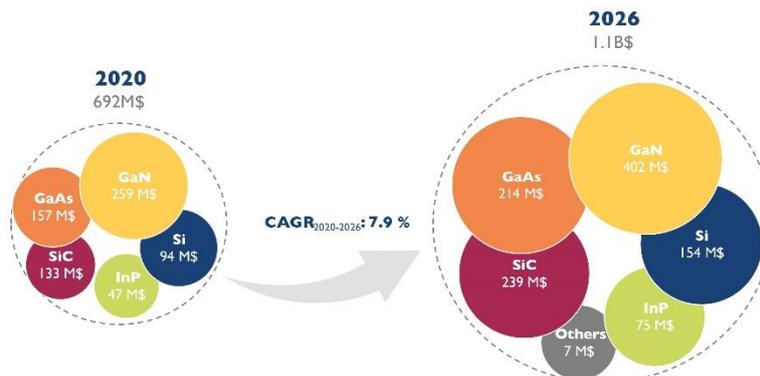
<sup>10</sup> SiC: Silicon Carbide

“We are at a crucial period of history where each device around us is becoming smarter, greener, and more compact.” asserts **Vishnu Kumaresan, PhD., Technology & Market Analyst, Semiconductor Manufacturing at Yole Développement (Yole)**. He adds: “Even the excruciating COVID-19 situation has had nothing more than a positive impact on the semiconductor industry by only further accelerating technological innovation. In such an innovation race to add more functionalities into our everyday devices using the More-than-Moore approach, the PPAC<sup>11</sup> factor is improved not only by scaling but also by using non-Si materials and by heterogeneously integrating them to one another”.

In this regard, Si market segment, along with other market segments including non-classical substrates such as GaAs, GaN, SiC, and InP, is growing at significant CAGRs. However, the choice of these materials comes with stringent material quality requirements and hence necessitates ultra-pure thin films grown using epitaxy equipment.

### 2020-2026 epitaxy equipment market evolution by epi-material

(Source: Epitaxy Equipment for More than Moore 2021 report, Yole Développement, 2021)



As of 2020, epitaxy equipment sales for More-than-Moore applications amounted to around US\$692 million and are expected to grow to US\$1.1 billion by 2026, with a CAGR<sub>2020-2026</sub> of 8%. However, these figures do not do justice to the vitality and omnipresence of the epitaxy step in mission-critical applications in market segments such as automotive (EV/HEV<sup>12</sup>), consumer (smartphone, smartwatch, AR/VR<sup>13</sup>), and aerospace & defense. It is further intriguing to realize that these complex epitaxy equipment systems used in HVM<sup>14</sup> are supplied by only very few players, including some not very well known in the mainstream front-end market.

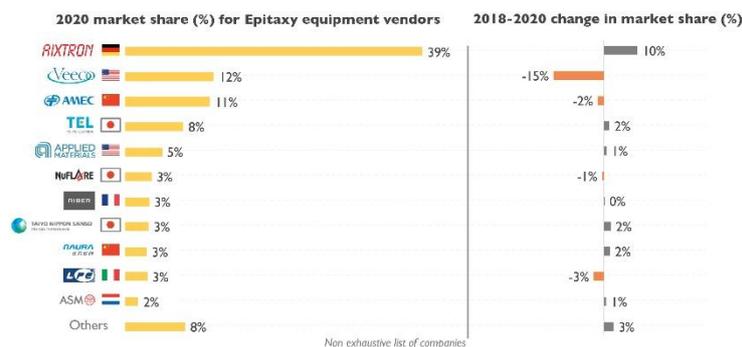
The market research and strategy consulting company, Yole releases today the Epitaxy Equipment for More than Moore 2021 report. With this new semiconductor manufacturing

<sup>11</sup> PPAC: Power-Performance-Area-Cost  
<sup>12</sup> EV/HEV: Electric Vehicle / Hybrid Electronic Vehicle  
<sup>13</sup> AR/VR: Augmented Reality / Virtual Reality  
<sup>14</sup> HVM: High Volume Manufacturing

study, analysts present the status of epitaxy equipment market and provide detailed information about different applications. Aim of Yole’s semiconductor manufacturing team is to deliver a comprehensive overview of the technological trends involving epitaxial layers. The report also gives a significant snapshot of the equipment vendors, the competitive landscape and a deep exploration of supply-chain synergies by identifying key players in the epitaxy field.

### 2020 epitaxy equipment market share

(Source: Epitaxy Equipment for More than Moore 2021 report, Yole Développement, 2021)



NOTE: In case of HTCVD, the revenues are estimated only for applications and material systems that are in the scope of this report. HTCVD Epitaxy equipment revenues for total MtM space would be much higher.

As analyzed by this new [Epitaxy Equipment for More than Moore 2021 report](#), this high demand for equipment is only satisfied by very few equipment vendors, today.

In total, Yole has identified about 11 major epitaxy equipment vendors in the More than Moore space. The top three, Aixtron from Germany, Veeco from the US, and AMEC from China clearly dominated the market in 2020, with more than 60% of the market share by revenue. However, this market is more complex. Indeed, it is also occupied by various other front-end equipment giants. Yole’s analysts identified AMAT, TEL, ASM International, Naura for example; some domain-specific players such as Taiyo Nippon Sanso, NuFlare, LPE; and also some unidentified start-ups from China.

According to **Vishnu Kumaresan from Yole**: “The dominance by the top three players in 2020 was not a big surprise. Therefore, it has remained the case at least since 2018. However, if we look at the top-2 players, between 2018 and 2020, the Germany equipment company, Aixtron increased its market share by 10%, while Veeco has seen its market share fall by 15%. One of the many reasons for this is the US-China trade tension, which has chosen the semiconductor industry as one of their battlegrounds. This battle is even more pronounced in the epitaxy equipment space as the demand is primarily driven by China. As a result, 2020 resulted in one of the best sales years in China for Aixtron, with approximately 57% of their revenue coming from the region, in contrast to Veeco’s mere 13% revenue”.

Naturally, Aixtron continues to be the leader in the overall epitaxy equipment market, with Veeco retaining its second spot (thanks to its improved MBE revenue in 2020).

In parallel, AMEC follows closely in third place with a good volume of equipment shipped for LED devices.

With the geopolitical situation evolving and the supply chain ever more fragile, Yole's analysts expect the competition between equipment vendors to intensify in the coming years.

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*Experts also realize various key presentations, organize key conferences and interview leading industrial companies. Their aim is to deliver key results and technology and market trends and explain the major changes.*

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### About our Semiconductor Manufacturing team

**Vishnu Kumaresan, PhD.**, is a Technology & Market analyst in the Semiconductor Manufacturing Team, part of the Semiconductor, Memory & Computing division of Yole Développement, France. He focuses on the semiconductor manufacturing domain, covering both equipment and material segments. His scope includes mainstream microelectronic applications as well as More-than-Moore applications. Having lived and worked in four countries, he has more than 11 years of international experience in the electronics industry, covering semiconductor, display, and software technologies. Prior to joining Yole, he worked as an Epitaxy engineer at Aledia, an advanced startup in the microLED display industry and has previously gained corporate experience at IMEC, CNRS, Saint-Gobain and Infosys. Vishnu obtained his PhD in Epitaxy, Material Physics & Chemistry from Sorbonne University, France, and his Masters in Microelectronics from National University of Singapore and Technical University of Munich, Germany.

**Gaël Giusti, PhD.**, is a Technology & Market Analyst specializing in Semiconductor Manufacturing at Yole Développement (Yole). As part of the Semiconductor, Memory & Computing division at Yole, Gaël's expertise is focused on materials, equipment, and manufacturing processes. He is involved daily in the production of technology & market reports and custom consulting projects. Prior to Yole, Gaël served as a R&D engineer at SilTronix Silicon Technologies for 5 years where he was in charge growing epitaxial AlN thin film on sapphire for RF applications. Gaël holds a master's degree from ENSICAEN (Caen, France) as well as a PhD in Materials Science from the University of Birmingham (UK).

**Taguhi Yeghoyan PhD.**, is a Technology & Market Analyst, Semiconductor Manufacturing at Yole Développement (Yole), within the Semiconductor, Memory & Computing division. Taguhi's mission is to follow daily the semiconductor industry and its evolution. Based on her expertise in this field, especially on the semiconductor value chain (processes, materials, equipment, and related applications), Taguhi performs technology & market reports and is engaged in dedicated custom projects. Prior to Yole, she worked in world-class European research centers and laboratories, including imec (Belgium), LMI (Lyon, France) and LTM at CEA Leti (Grenoble, France). All along her past experiences, Taguhi has authored or co-authored one patent and more than nine papers. She has graduated from Wroclaw University of Technology (Poland) and University of Lyon (France). Taguhi also completed her PhD. in Material Science from the University of Lyon (France).

**Emilie Jolivet** is Director of the Semiconductor, Memory & Computing Division at Yole Développement, part of Yole Group of Companies, where her specific interests cover package & assembly, semiconductor manufacturing, memory and software & computing fields. Based on her valuable experience in the semiconductor industry, Emilie manages the expansion of the technical and market expertise of the Semiconductor and Software Team. The team interacts daily with leading companies allowing semiconductor & software analysts to collect a large amount of data and integrate their understanding of the evolution of the market with technology breakthroughs. In addition, Emilie's mission focusses on the management of business relationships with semiconductor leaders and the development of market research and strategy consulting activities inside the Yole group. Emilie Jolivet holds a Master's degree in Applied Physics specializing in Microelectronics from INSA (Toulouse, France). After an internship in failure analysis at Freescale (France), she was an R&D engineer for seven years in the photovoltaic business where she co-authored several scientific articles. Enriched by this experience, she graduated with an MBA from IAE Lyon and then joined EV Group (Austria) as a business development manager in 3D & Advanced Packaging before joining Yole Développement in 2016

### About the report

#### **Epitaxy Equipment for More than Moore 2021**

*The market for epitaxy equipment, such as MOCVD, HTCVD, and MBE, crucial in Power and Optoelectronic applications, is expected to reach around \$1.1 B in 2026. – Performed by Yole Développement*

#### **Companies cited:**

Aixtron, AMEC, Applied Materials, ASM International, CSD Epitaxy, DCA Instruments, Epiluvac, Epistar, II-VI, Infineon, IntelliEPI, IQE, LPE S.p.A, MBE Komponenten, Naura, Nexperia, NuFlare, Onsemi, Power Integrations,

Riber, SOITEC, STMicroelectronics, Taiyo Nippon Sanso, Tokyo Electron (TEL), TOPEC, TSMC, Veeco, VPEC, Wolfspeed, X-Fab and many more...

### Related reports:

- [GaN Power 2021: Epitaxy, Devices, Applications and Technology Trends](#)
- [Lithography and Bonding equipment for More than Moore 2021](#)
- [MicroLED Displays – Market, Industry and Technology Trends 2021](#)
- [SiC Transistor Comparison 2020](#)
- [Hamamatsu Photodiode and Laser in Livox's Horizon LiDAR](#)

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