Semiconductor_BackEnd

Weekly Intelligence Report

2026-08-22 | 23 articles | 9 countries

troy-technical.jp

This Week's Keyword

AI Packaging Bottlenecks

HBM, substrates, and materials constrain AI growth.

23 articles	9 countries	70 %	70+ %
Total Articles	Source Countries	HBM4 Price Hike	Adv. Pkg Revenue Growth

All 23 Articles This Week — 5-Axis Evaluation Matrix

How to read columns — Tech Novelty: degree of breakthrough Market Proximity: closeness to commercialization Market Impact: industry-wide effect Data Reliability: quantitative data & peer review US/EU Relevance: direct impact on US/European companies & supply chains

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#01	SK Hynix HBM4 US Pkg	Corporate Strategy	●●●●○	●●●●●	●●●●●	●●●●○	●●●●●	SK Hynix raises HBM4 prices 70%, sells out 2026, invests $3.87B in US packaging plant for 2028.
#02	HBM4 Thermal/Power Eff.	Technology Overview	●●●●○	●●●○○	●●●●○	●●●○○	●●●●○	HBM4 doubles I/O to 2048-bit, achieves 20%+ thermal reduction via hybrid bonding, 40% power efficiency boost.
#03	SK Hynix Optical CPO	Research	●●●●●	●○○○○	●●●●○	●●●●●	●●●●○	SK Hynix explores optical chip connections (CPO) beyond HBM for AI, outlining photonic interposer roadmap.
#04	Hanmi HBM4 TC Bonder	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●○○	●●●●○	Hanmi Semiconductor leads HBM4 TC bonder market, diversifies clients with Micron deals, reducing SK Hynix reliance.
#05	China $5.5B Adv. Pkg	Corporate Strategy	●●●○○	●●●●○	●●●●●	●●●○○	●●●●●	China invests $5.5B in 10+ advanced packaging projects for AI/HPC, aiming for self-sufficiency and mitigating shortages.
#06	Hanmi $92M Plant, US	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●○○	●●●●●	Hanmi Semiconductor invests $92M in largest plant for AI/HBM equipment, enters US market with HANMI USA.
#07	Amkor US Pkg Expansion	Corporate Strategy	●●○○○	●●●●○	●●●●○	●●●●○	●●●●●	Amkor expands US advanced packaging footprint by 67 acres in Arizona, bolstering domestic manufacturing with CHIPS Act support.
#08	JCET H1 2026 Growth	Corporate Strategy	●●○○○	●●●●●	●●●●○	●●●●○	●●●●○	JCET reports 79.4% YoY net profit growth in H1 2026, accelerating advanced packaging expansion for AI demand.
#09	PackCon 2026	Event	●○○○○	●○○○○	●○○○○	●●○○○	●●○○○	PackCon 2026 in Singapore to discuss how sustainable packaging drives business value and supply chain resilience.
#10	Adv. TIMs for AI Heat	Technology Overview	●●●●○	●●○○○	●●●●○	●●●○○	●●●●○	TIMs evolve to combat AI chip heat (approaching 1000W), addressing liquid metal pump-out and polymer viscosity limits.
#11	Applied Mat. Adv. Pkg	Corporate Strategy	●●●○○	●●●●○	●●●●●	●●●●○	●●●●●	Applied Materials raises 2026 advanced packaging revenue forecast to 70%+ growth, unveils new HBM/packaging systems.
#12	SK Hynix Indiana Plant	Corporate Strategy	●●●●○	●●●●○	●●●●●	●●●●○	●●●●●	SK Hynix breaks ground on $3.87B Indiana plant for HBM packaging/R&D;, supported by $950M US CHIPS Act funding.

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#13	ABF Substrate Shortage	Market Analysis	●●○○○	●●●●●	●●●●●	●●●○○	●●●●●	ABF substrate shortages projected through 2028 due to AI boom; Asian manufacturers secure orders until 2030.
#14	Inspection Market $13.4B	Market Analysis	●●●○○	●●●○○	●●●●○	●●●○○	●●●●●	Semiconductor inspection market to hit $13.4B by 2034; KLA leads in advanced packaging process control with new tools.
#15	Fraunhofer OCT 8μm	Research	●●●●○	●●○○○	●●●○○	●●●●●	●●●●●	Fraunhofer IKTS develops OCT system for real-time, non-destructive detection of 8μm packaging seal defects.
#16	STM $2B Investment	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●●○	●●●●●	STMicroelectronics maintains $2B investment despite net loss, focusing on SiC, 300mm fabs, and advanced packaging (PLP).
#17	Shinko 22-Layer Glass	Research	●●●●●	●●○○○	●●●●○	●●●○○	●●●●○	Shinko Electric develops 22-layer glass substrates for AI chips, resolving internal cracking/delamination issues.
#18	TSMC CoWoS/ABF Bottl.	Market Analysis	●●○○○	●●●●●	●●●●●	●●●○○	●●●●●	TSMC CoWoS and ABF substrate bottlenecks threaten AI chip production, limiting output despite $265B market opportunity.
#19	Samsung EM Upgrade	Market Analysis	●●○○○	●●●●●	●●●●○	●●●○○	●●●●○	Morgan Stanley upgrades Samsung Electro-Mechanics to top Korean tech pick due to surging AI demand for advanced substrates.
#20	Pkg Material Price Hike	Market Analysis	●●○○○	●●●●●	●●●●●	●●●○○	●●●●●	Sumitomo Bakelite and Mitsubishi Chemical raise packaging material prices for CoWoS/HBM due to surging AI demand.
#21	HANMI $91.4M Plant	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●●○	●●●●○	HANMI Semiconductor invests $91.4M in its largest 8th plant in Incheon for HBM/2.5D packaging equipment, mass production Q2 2027.
#22	Henkel CDF900 Film	New Product	●●●●○	●●●●○	●●●●○	●●●●○	●●●●●	Henkel launches LOCTITE ABLESTIK CDF900 conductive die attach film (>8 W/m-K) for high-power AI packages, improving thermal management.
#23	Lens TGV Substrates	Corporate Strategy	●●●●○	●●●○○	●●●●○	●●●○○	●●●●●	Lens Technology enters advanced chip packaging with self-developed TGV substrates; 30,000sqm factory starts by year-end.

●●●●○ High ●●●○○ Med-High ●●○○○ Med ●○○○○ Low | Yellow highlight = featured article

Three Questions That Demand Your Decision This Week

❶ Is your HBM supply chain resilient to price hikes and capacity shifts?

SK Hynix hiked HBM4 prices by 70% and sold out 2026 supply, investing heavily in US packaging. Evaluate long-term contracts and alternative suppliers to mitigate cost and supply risks.

❷ Are ABF substrates and CoWoS packaging bottlenecks limiting your AI roadmap?

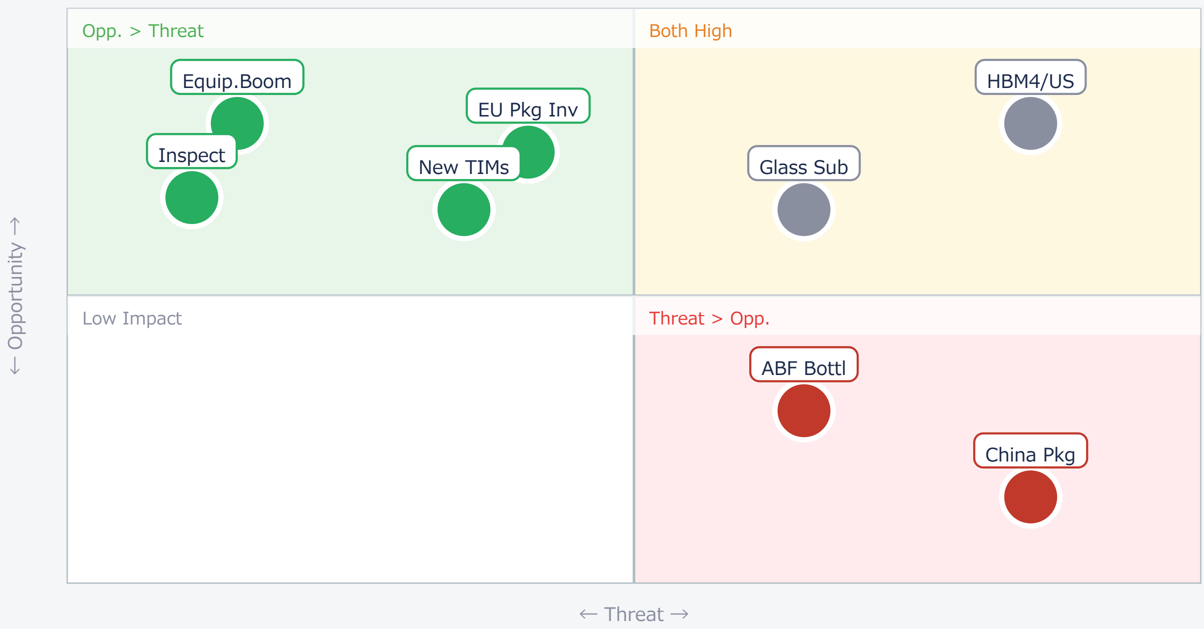
ABF substrate shortages are projected through 2028, and CoWoS capacity remains constrained, directly impacting AI chip production. Assess your access and diversification strategies for these critical components.

❸ How will China's $5.5B advanced packaging push impact your competitive edge?

China is aggressively investing in 2.5D/3D, chiplet, and HBM packaging, including new TGV glass substrate players, threatening US/EU market share and IP in critical back-end processes.

Opportunities vs. Threats for US/European Companies

Opportunity vs. Threat Matrix for US/European Companies



Item	Quadrant	↑ Opportunity	↓ Threat
● HBM4/US	Critical	Secure US HBM supply	High HBM prices
● Equip.Boom	Opp.	Adv. Pkg. market	Competition
● ABF Bottl	Threat	—	AI chip production
● China Pkg	Threat	—	Market share erosion
● New TIMs	Opp.	AI thermal solutions	Lagging adoption
● Glass Sub	Critical	Next-gen packaging	Asian dominance
● Inspect	Opp.	Yield/reliability tools	Outdated methods
● EU Pkg Inv	Opp.	Domestic EU capacity	Limited scale

Deep Dive ① — HBM4 Market Dynamics & US Investment

#01 | 2026/08/20 | Adalytica 他 | Tech Novelty●●●●○ Proximity●●●●● Market Impact●●●●● Data Reliability●●●●○ US/EU Relevance●●●●●

SK Hynix has increased HBM4 prices by ~70% for 2026, with supply already sold out under long-term contracts. This reflects intense demand for AI memory and SK Hynix's market dominance.

The company is investing $3.87 billion in a new advanced HBM packaging plant in Indiana, U.S., targeting mass production in H2 2028. This move aims to reduce reliance on TSMC, shorten lead times, and capture more margin, strengthening the AI server HBM supply chain.

▶ Strategic Analyst's Perspective

[Opportunity] For US/EU AI accelerator developers, this US plant offers a localized HBM supply option, potentially reducing geopolitical risk and lead times. It also signals a robust, albeit expensive, HBM market. [Threat] The 70% price hike for HBM4 will significantly increase AI server costs, impacting profitability for OEMs. Reliance on a few dominant HBM suppliers (SK Hynix, Samsung, Micron) creates supply chain vulnerability. [Next Actions] [Procurement] Immediately review HBM supply contracts and pricing forecasts through 2028. [Strategy] Evaluate long-term HBM sourcing diversification, including potential partnerships or investments in alternative suppliers. [R&D;] Accelerate efforts to optimize AI models for lower HBM consumption or explore alternative memory architectures.

Deep Dive ② — Applied Materials & Adv. Pkg Boom

#11 | 2026/08/14 | TrendForce | Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●●● Data Reliability●●●●○ US/EU Relevance●●●●●

Applied Materials revised its 2026 advanced packaging revenue forecast to over 70% YoY growth, a 20-point increase in three months, driven by surging AI semiconductor investments.

The company unveiled six new systems for HBM and advanced packaging, including the Nokota™ VMax™ 2 ECD system, to capitalize on this market expansion. This highlights the shift to advanced packaging as a primary driver for AI performance.

▶ Strategic Analyst's Perspective

[Opportunity] For US/EU semiconductor equipment manufacturers, this signals a massive, sustained growth opportunity in advanced packaging, particularly for HBM and 3D stacking. Applied Materials' success validates investment in these areas. [Threat] Companies not investing heavily in advanced packaging equipment or lacking competitive solutions risk losing market share to leaders like Applied Materials. The complexity of these new systems also raises the barrier to entry. [Next Actions] [R&D;] Benchmark current advanced packaging equipment capabilities against Applied Materials' new offerings. [Business Dev] Identify and pursue strategic partnerships with OSATs and IDMs expanding HBM/3D packaging capacity. [Executive] Re-evaluate capital expenditure plans to ensure sufficient investment in next-gen packaging tool development.

Deep Dive ③ — New TIM for High-Power AI Packages

#22 | 2026/08/19 | Henkel | Tech Novelty●●●●○ Proximity●●●●○ Market Impact●●●●○ Data Reliability●●●●○ US/EU Relevance●●●●●

Henkel introduced LOCTITE ABLESTIK CDF900, a conductive die attach film with >8 W/m-K thermal conductivity, designed for high-power AI packages.

This film-based solution addresses thermal management challenges and eliminates issues like material bleed-out and uneven bond line thickness common with liquid adhesives, enhancing reliability and yield for AI chips approaching 1,000W.

▶ Strategic Analyst's Perspective

[Opportunity] For US/EU materials suppliers, this demonstrates a critical market need for advanced TIMs. Companies with innovative thermal management solutions can gain significant market share in the AI hardware ecosystem. [Threat] For US/EU OEMs and device manufacturers, failure to adopt high-performance TIMs like CDF900 will lead to thermal bottlenecks, reduced AI chip performance, and reliability issues, making their products uncompetitive. [Next Actions] [R&D;] Evaluate CDF900 and other next-gen TIMs for integration into current and future AI package designs. [Procurement] Engage with Henkel and other advanced materials suppliers to secure supply and understand performance benchmarks. [Engineering] Conduct internal testing to validate thermal performance and reliability benefits in specific AI applications.

Other Notable Articles

SK Hynix Explores Optical Chip Connections Beyond HBM, Outlining Roadmap for Broad AI Bandwidth Challenges in Nature Electronics (Adalytica (Nature Electronics引用))

Tech Novelty●●●●● Proximity●○○○○ Market Impact●●●●○

Long-term vision for AI interconnects beyond HBM using CPO and photonic interposers; monitor for future breakthroughs.

China Invests 40 Billion Yuan ($5.5 Billion) in New Advanced Packaging Projects for AI/HPC to Prepare for Next Chip Shortage (All-About-Industries)

Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●●●

China's aggressive $5.5B investment in advanced packaging (2.5D/3D, chiplet, HBM) signals a major competitive shift.

ABF Substrate Shortages Projected Through 2028 Amid AI Boom; Taiwanese, Japanese, Korean Manufacturers Secure Orders Until 2030 (digitimes)

Tech Novelty●●○○○ Proximity●●●●● Market Impact●●●●●

Critical ABF substrate shortages will persist through 2028, impacting AI chip production; secure long-term supply now.

Fraunhofer IKTS Achieves Real-Time Detection of 8μm Packaging Seal Defects Using Optical Coherence Tomography (OCT) (Fraunhofer-Gesellschaft)

Tech Novelty●●●●○ Proximity●●○○○ Market Impact●●●○○

German research delivers real-time, non-destructive 8μm defect detection via OCT, crucial for advanced packaging yield.

STMicroelectronics Maintains $2 Billion Investment Amid Net Loss, Bolstering SiC, 300mm Fabs, and Advanced Packaging (Seeking Alpha)

Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●●○

STM's sustained $2B investment in SiC, 300mm, and panel-level packaging strengthens EU's domestic capabilities.

Recommended Actions This Week

Action recommendations based on article evaluation matrix and opportunity/threat analysis.

Immediate (this week)

- [Procurement] Conduct urgent audit of HBM, ABF substrate, and advanced packaging material supply contracts and lead times through 2028.
- [Strategy] Assess exposure to potential price increases from key Asian suppliers for HBM and packaging materials.
- [R&D;] Initiate preliminary evaluation of Henkel's new CDF900 die attach film for thermal management in high-power AI packages.

Short-term (1 month)

- [Supply Chain] Develop contingency plans for ABF substrate and CoWoS capacity bottlenecks, exploring alternative suppliers or design changes.
- [Business Dev] Investigate potential partnerships or licensing opportunities for advanced inspection technologies (e.g., OCT) for in-line quality control.
- [Strategy] Analyze China's $5.5B advanced packaging investment and TGV substrate entry to identify direct competitive threats and market shifts.

Medium-long term (quarter+)

- [R&D;] Establish dedicated research programs for next-generation packaging materials (e.g., glass substrates, advanced TIMs) and optical interconnects (CPO).
- [Executive] Formulate a long-term strategy for securing critical advanced packaging capacity, including potential domestic investments or strategic alliances.
- [Legal/IP] Review IP landscape for advanced packaging, glass substrates, and optical interconnects to protect existing assets and identify licensing opportunities.

Semiconductor_BackEnd — Selected Articles

Date: 2026-08-22

Articles: 23

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#20 TSMC CoWoS and ABF Substrate Supply Bottlenecks Threaten AI Chip Production Amid $265B Market Opportunity

#21 Morgan Stanley Upgrades Samsung Electro-Mechanics to Top Korean Tech Pick Amid Surging AI Demand

#22 Sumitomo Bakelite and Mitsubishi Chemical Raise Packaging Material Prices for CoWoS and HBM Amid Surging Demand

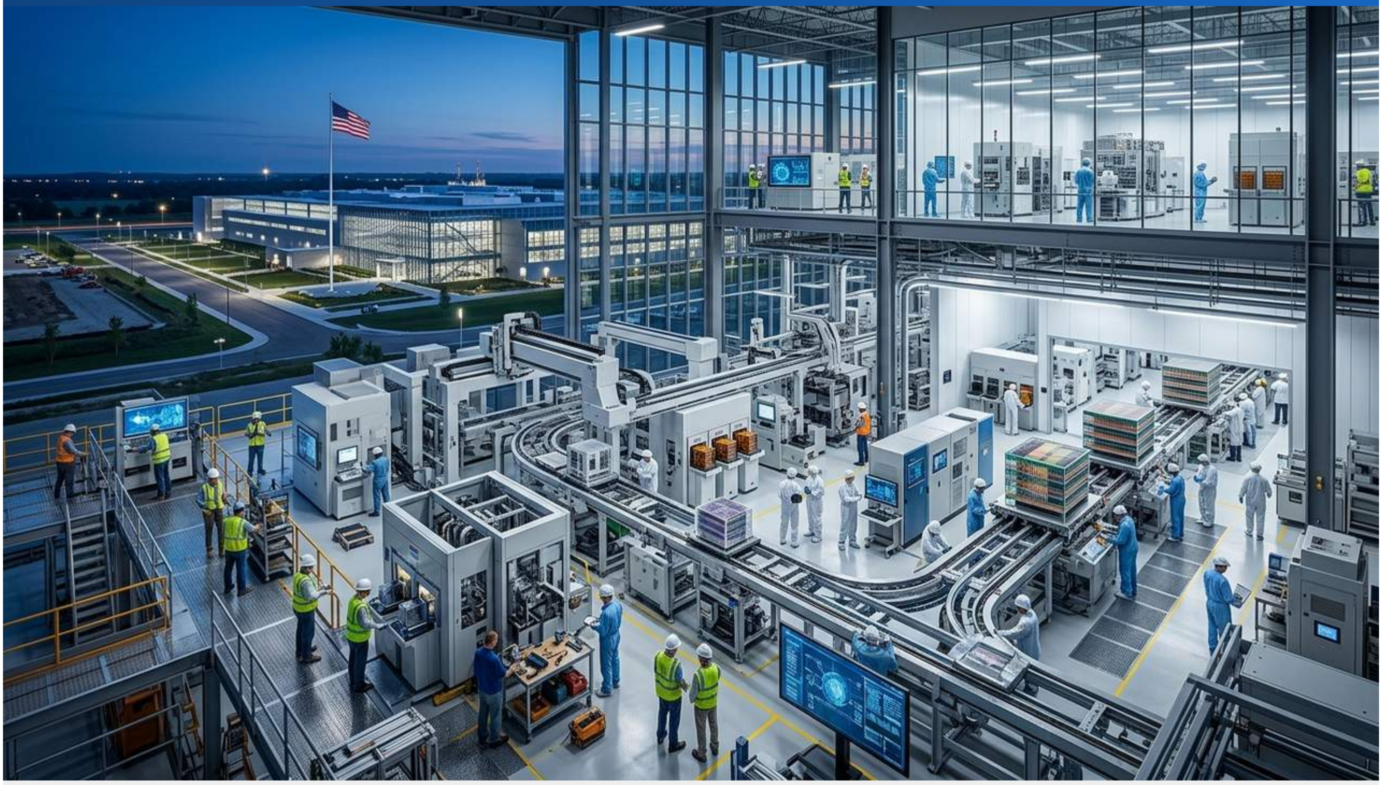
#23 HANMI Semiconductor Invests $91.4 Million in Largest-Ever 8th Production Facility in Incheon to Meet Soaring AI Chip Demand

#24 Henkel Launches LOCTITE ABLESTIK CDF900 Conductive Die Attach Film with Over 8 W/m-K Thermal Conductivity for High-Power AI Packages

#25 Lens Technology Enters Advanced Chip Packaging with Self-Developed Through-Glass Vias (TGV) Substrates and Dedicated 30,000sqm Factory

#01 SK Hynix Hikes HBM4 Prices by 70%, Sells Out 2026 Supply, Invests $3.87B in US Packaging Plant for In-House Production

Published Published August 20, 2026 Adalytica 他 South Korea



OVERVIEW

SK Hynix has signaled its dominance in the High Bandwidth Memory (HBM) market by reportedly increasing HBM4 prices by 70% for its 2026 supply, which is already entirely presold. Concurrent with this market power, the company is investing $3.87 billion in a new U.S. advanced packaging plant to internalize HBM production by H2 2028, reducing reliance on external foundries and securing a critical supply chain for AI servers. This aggressive strategy underscores a significant structural shift as HBM's share of total DRAM wafer capacity is projected to surge to 23% by late 2026, reshaping the global memory landscape.

IN DEPTH

Background

The burgeoning complexity and scale of artificial intelligence (AI) models have firmly established High Bandwidth Memory (HBM) as a critical enabler, essential for overcoming performance bottlenecks in modern AI servers and data centers. The unprecedented demand for advanced memory is further underscored by the emergence of next-generation platforms, such as NVIDIA's Vera Rubin, which are designed to exclusively utilize HBM4. This intense surge in demand is compelling DRAM manufacturers to undertake massive investments in HBM production capacity and cutting-edge advanced packaging technologies, catalyzing a significant strategic realignment across the entire semiconductor supply chain.

Beyond technological leadership, SK Hynix's strategic expansion, particularly into the U.S., addresses escalating geopolitical considerations and the increasing imperative for securing resilient, localized domestic supply chains for critical AI components. This localization strategy is particularly pertinent given the projected fundamental shift in the global memory market: HBM's share of total DRAM wafer capacity is forecasted to rise from 18% at the end of 2025 to 23% by the end of 2026. This transformative impact on the pricing and supply dynamics of other DRAM products suggests a comprehensive reshaping of the broader memory landscape.

Key Findings

SK Hynix, a dominant force in the High Bandwidth Memory (HBM) market, has reportedly raised HBM4 prices by approximately 70% for its 2026 supply, which is already fully sold out under long-term contracts. To further solidify its leadership and internalize critical production steps, the company is investing $3.87 billion in a new advanced HBM packaging plant in West Lafayette, Indiana, U.S., with mass production targeted for the second half of 2028. This strategic move aims to reduce reliance on external foundries like TSMC, shorten lead times, and capture higher profit margins for a crucial component of AI servers.

HBM4 represents the sixth generation of high bandwidth memory, engineered to meet the escalating demands of next-generation AI and high-performance computing (HPC). A significant architectural redesign, HBM4 doubles the I/O width from 1024 to 2048 bits, targeting over 2.0 TB/s per stack in 2026. SK Hynix plans to integrate 16-high stacking and transition from traditional microbumps to hybrid bonding. This innovative bonding technique is designed to achieve surface flatness of less than 1nm and significantly improve heat dissipation by over 20% compared to micro-bump architectures. The company is also exploring stacking HBM4 directly on logic processors, potentially revolutionizing future AI accelerator designs.

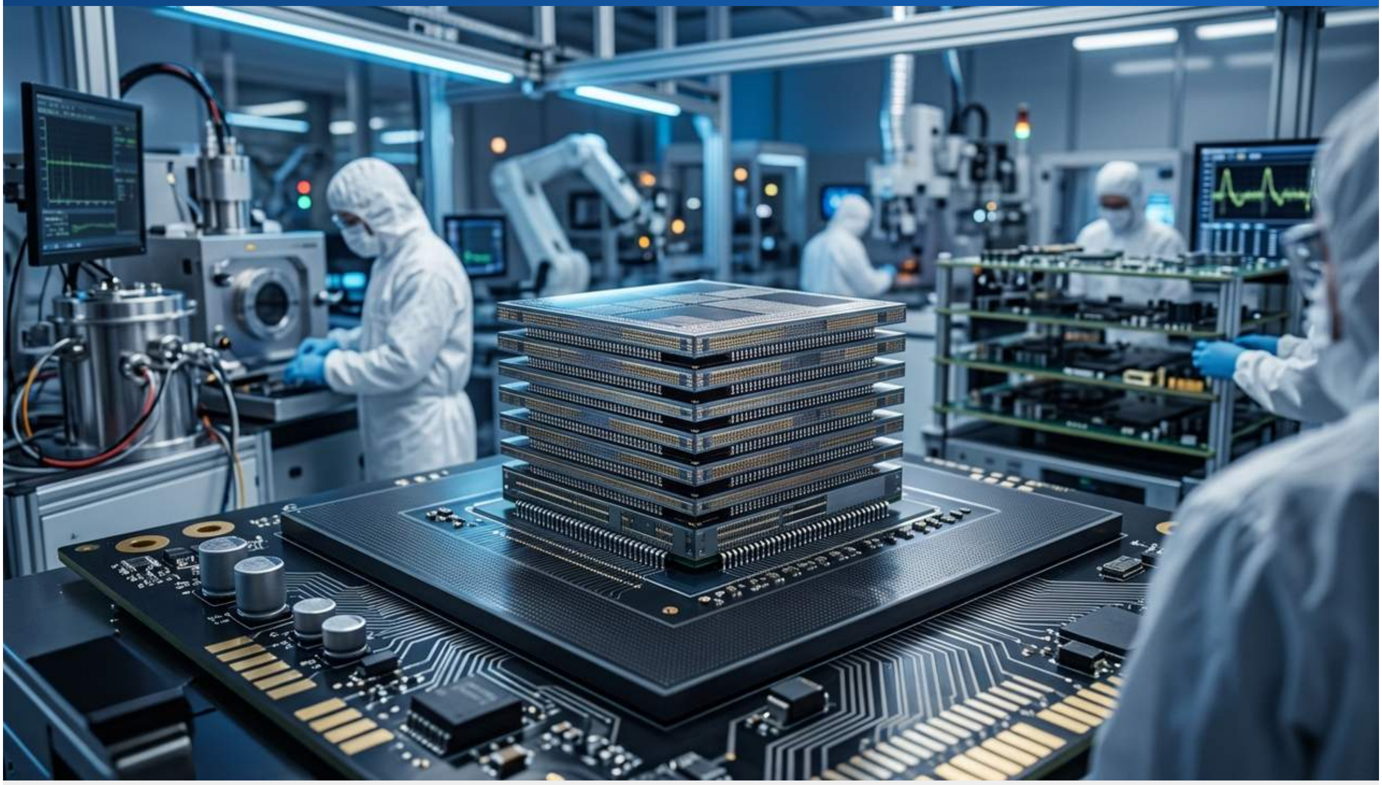
This substantial investment in the Indiana plant complements SK Hynix's broader capacity expansion strategy, which includes doubling wafer capacity and constructing new fabs in Cheongju, South Korea. SK Hynix's aggressive investments in HBM4 technology and manufacturing capacity are pivotal for maintaining its market leadership and ensuring a robust supply for the AI era. While the adoption of hybrid bonding is particularly significant for enabling higher stack counts and superior thermal management in HBM, the reported 70% price increase for HBM4 will present considerable cost challenges for AI chip developers, potentially influencing future hardware designs and market dynamics. By doubling production capacity and internalizing advanced packaging, SK Hynix aims to ensure stable supply and drive innovation, solidifying its competitive advantage.

Source: https://adalytica.com/news/sk-hynix-hbm-packaging-indiana-061ff122

Collected: August 21, 2026 | Automated Research System (Gemini API)

#02 HBM4 Achieves 20%+ Thermal Reduction via Hybrid Bonding, Boosting Power Efficiency by 40% with 2048-bit I/O and >2.0TB/s Bandwidth

Published Published August 14, 2026 SemiHub.io 他 International



OVERVIEW

HBM4, the next-generation High Bandwidth Memory, is set to significantly advance AI/HPC performance by doubling its I/O width to 2048 bits, targeting over 2.0 TB/s bandwidth per stack and substantial power efficiency gains. This leap is driven by the adoption of hybrid bonding, which is projected to reduce thermal resistance by over 20% in 16-high stacks and improve IOPS per Watt by up to 40% compared to HBM3E. With its base die shifting to advanced nodes and designed for co-processor integration, HBM4 is positioned as a critical technology for the AI/HPC market, with mass production anticipated from late 2025 to 2026.

IN DEPTH

Background

High Bandwidth Memory (HBM) technology has undergone significant evolution over the past 13 years, establishing itself as an indispensable component for accelerating AI chip performance. With the supply of GPUs and HBM for AI servers and data centers projected to remain constrained through 2026, the transition from HBM3E to HBM4 is an essential step to further enhance AI accelerator capabilities. Next-generation AI platforms, exemplified by NVIDIA's Vera Rubin, are anticipated to exclusively require HBM4, driving specifications beyond current JEDEC standards. This robust market demand is accelerating plans for major HBM vendors—Samsung, SK Hynix, and Micron—to commence mass production of HBM4 between late 2025 and 2026.

Key Findings

HBM4, the forthcoming generation of High Bandwidth Memory, is set to redefine performance and efficiency benchmarks. It achieves this by doubling its I/O width from 1024 to 2048 bits, aiming for bandwidths exceeding 2.0 TB/s per stack. This monumental advancement is critically enabled by the adoption of hybrid bonding technology, which is projected to reduce thermal resistance by over 20% in 16-high stacks and enhance IOPS (Input/Output Operations Per Second) per Watt by up to 40% compared to its predecessor, HBM3E. HBM4 is therefore positioned as a pivotal solution to fundamentally alleviate data movement bottlenecks prevalent in artificial intelligence (AI) and high-performance computing (HPC) applications.

Technical and Market Details

As the sixth iteration of High Bandwidth Memory, HBM4 introduces a 2048-bit memory interface featuring 32 independent channels, representing the most significant architectural redesign in HBM history. This expanded interface facilitates lower operating frequencies relative to the immense bandwidth, leading to substantial improvements in power efficiency. A key shift involves the HBM4 base die migrating from mature logic nodes to advanced process nodes (N5/N3 class). Reports indicate SK Hynix is outsourcing its base die production to TSMC, while Samsung leverages its proprietary 4nm-class foundry, underscoring the industry's commitment to cutting-edge process technology for HBM.

The most transformative technical innovation in HBM4 is its embrace of hybrid bonding (copper-to-copper bonding). This advanced interconnection method is implemented to effectively manage the increased heat generated by denser 16-high stack configurations. By eliminating physical gaps between dies, hybrid bonding significantly lowers thermal resistance, promising over 20% better heat dissipation compared to conventional micro-bump architectures. The stringent requirements for hybrid bonding necessitate extremely high precision, with surface flatness tolerances less than 1 nanometer, making meticulous process control paramount for achieving acceptable yields. Furthermore, HBM4 is engineered beyond a mere memory stack; it integrates logic dies to function as a co-processor, thereby augmenting the processing capability and flexibility of AI accelerators.

Strategic Significance and Outlook

The advent of HBM4 is poised to establish new benchmarks in AI and HPC system design, enabling the development of significantly higher-performance and more power-efficient systems. The ongoing maturation and widespread adoption of hybrid bonding technology will be instrumental in facilitating even higher HBM stacking and increased layer counts, with 16-high stacks anticipated to become standard for future HBM4E (mass production projected for 2027–2028). These comprehensive advancements promise tangible benefits, including reduced data center power consumption and accelerated AI model training times. Fundamentally, HBM4 is strategically positioned to alleviate critical bottlenecks in the AI semiconductor supply chain and drive further innovations in AI technology, cementing its increasing importance in the coming years.

Source: https://semihub.io/en/blog/hbm-guide-2.html

Collected: August 21, 2026 | Automated Research System (Gemini API)

#04 SK Hynix Explores Optical Chip Connections Beyond HBM, Outlining Roadmap for Broad AI Bandwidth Challenges in Nature Electronics

Published Published August 21, 2026   Adalytica (Nature Electronics引用)   South Korea

OVERVIEW

SK Hynix is charting a course for optical chip connections that extend beyond High Bandwidth Memory (HBM) to address critical bandwidth limitations in large-scale AI systems. A recent Nature Electronics review paper highlights Co-Packaged Optics (CPO) and a future photonic interposer as key technologies to overcome the data movement bottleneck, which increasingly lags behind computing throughput growth. This initiative targets shared memory pools and XPU interconnectivity, although specific implementation timelines and standardization plans remain undisclosed.

IN DEPTH

Background

The explosive growth of AI workloads, particularly for large language models (LLMs) and complex neural networks, is driving an insatiable demand for high-performance computing components like GPUs and HBM. However, simultaneously, the data transfer capabilities *between* these components and across entire systems are emerging as critical constraints. Traditional electrical interconnect technologies are struggling to meet the terabyte-per-second data transfer requirements, creating a fundamental 'data movement bottleneck' that limits the scalability and efficiency of AI infrastructure. This challenge extends beyond HBM, affecting system-level communication between multiple AI accelerators and vast memory banks, as interconnect bandwidth growth fails to keep pace with the exponential increase in computing throughput.

Overview of Research

In response to these pervasive bandwidth challenges, SK Hynix is actively exploring a comprehensive roadmap for optical chip connections that extend significantly beyond the limitations of current High Bandwidth Memory (HBM) implementations. The company recently published a review paper in Nature Electronics, emphasizing the critical role of Co-Packaged Optics (CPO) technology in overcoming the inherent interconnect bandwidth constraints for massive AI workloads. This initiative represents a long-term strategic quest to fundamentally resolve the escalating data movement bottleneck in the AI era.

Technical Vision and Roadmap

At the core of SK Hynix's proposed roadmap is a transformative vision to utilize light for high-speed, low-latency data communication between memory and logic chips. While current HBM offers impressive bandwidth for on-chip communication within individual AI accelerators, system-level data movement across multiple AI accelerators and large shared memory banks remains severely bottlenecked by conventional electrical connections. The company aims to extend optical connections, presently constrained primarily to HBM, to broader shared memory pools. Co-Packaged Optics (CPO) technology is identified as an immediate solution, integrating optical transceivers directly into processor packages. This enables the efficient conversion of electrical signals into optical ones, facilitating much longer-distance and higher-speed data transmission than purely electrical interconnects.

Looking further ahead, the paper outlines a long-term vision involving a single photonic interposer connecting diverse XPU (any type of processing unit) pools and their supporting memory pools. This advanced approach promises ultra-high bandwidth and ultra-low-latency data transfer, performance levels that are unachievable with conventional electrical wiring. The photonic interposer serves as a foundational technology for seamless optical communication between disparate chiplets, holding the potential to drastically improve the scalability, energy efficiency, and overall performance of future AI systems. However, realizing such innovative technology demands significant advancements in new material science, novel manufacturing processes, and the establishment of robust industry standards. Specific implementation timelines and standardization plans for this ambitious vision have not yet been disclosed.

Strategic Implications and Future Outlook

SK Hynix's research into optical chip connections represents a highly advanced and strategic step towards shaping the future of AI computing. The continued evolution and maturity of CPO and photonic interposer technologies could instigate profound transformations in AI chip design and system architecture, dramatically enhancing the performance, efficiency, and sustainability of next-generation AI servers, data centers, and even edge AI devices. Achieving this ambitious vision will necessitate substantial R&D investment, extensive industry-wide collaboration, and focused efforts on the miniaturization of optical components, optimization of power efficiency, seamless integration with existing semiconductor manufacturing processes, and comprehensive industry standardization. Leveraging its established leadership in the HBM market, SK Hynix is strategically positioned to pioneer this new frontier of optical interconnects, further driving semiconductor innovation in the AI era.

Source: https://xenospectrum.com/en/sk-hynix-cpo-roadmap/

Collected: August 21, 2026 | Automated Research System (Gemini API)

#05 Hanmi Semiconductor Leads HBM4 TC Bonder Market, Diversifies Client Base with Micron Deals to Reduce SK Hynix Dependency

Published August 13, 2026 digitimes Taiwan

OVERVIEW

Hanmi Semiconductor has gained a significant lead over competitor Hanwha Semitech in the crucial thermal compression (TC) bonder market for High Bandwidth Memory (HBM) manufacturing. This market advantage is driven by a resurgence in HBM4 equipment orders and an expanded partnership with Micron Technology, strategically diversifying its client base beyond its traditional reliance on SK Hynix. This development underscores Hanmi's strengthening technological leadership and market position in the burgeoning next-generation HBM sector, potentially reshaping the competitive landscape of semiconductor equipment suppliers.

IN DEPTH

Key Findings

Hanmi Semiconductor has established itself as a market leader in the critical thermal compression (TC) bonder sector for High Bandwidth Memory (HBM) manufacturing, surpassing its key competitor Hanwha Semitech. This market advantage is significantly bolstered by a recovery in HBM4 equipment orders and an expanded transactional relationship with Micron Technology.

Technical and Market Details

- HBM4 represents the next generation of memory, experiencing surging demand driven by advancements in artificial intelligence (AI) and high-performance computing (HPC), making sophisticated TC bonder technology indispensable for its production. Hanmi Semiconductor's TC bonders are highly regarded for their precision in stacking minuscule chips and their superior thermal management capabilities.
- Traditionally, SK Hynix has been a primary customer for Hanmi. However, the expanding engagement with Micron Technology allows Hanmi to diversify its customer base. This strategic move is expected to mitigate reliance on a single major client, potentially fostering more stable business growth.
- HBM4 demands higher stack counts and faster data transfer rates compared to its predecessor, HBM3E, necessitating enhanced precision and throughput from TC bonders. Hanmi's ability to address these advanced technical requirements enables it to maintain a competitive edge in the market.

Background and Industry Context

The explosive growth of the AI semiconductor market has dramatically accelerated the demand for high-performance HBM. HBM is a core component of AI accelerators, and its production capacity often becomes a bottleneck for the overall supply of AI chips. TC bonders are crucial equipment in the final stages of HBM stacking, responsible for electrical and thermal connections between chips, thus their supply capacity and technological level dictate overall HBM production.

Competition among semiconductor equipment manufacturers is intense, particularly in high-growth segments like HBM, where technological innovation and securing a strong customer base are key to success. Hanmi Semiconductor's strategic customer diversification and early lead in the HBM4 market position it advantageously within this competitive landscape.

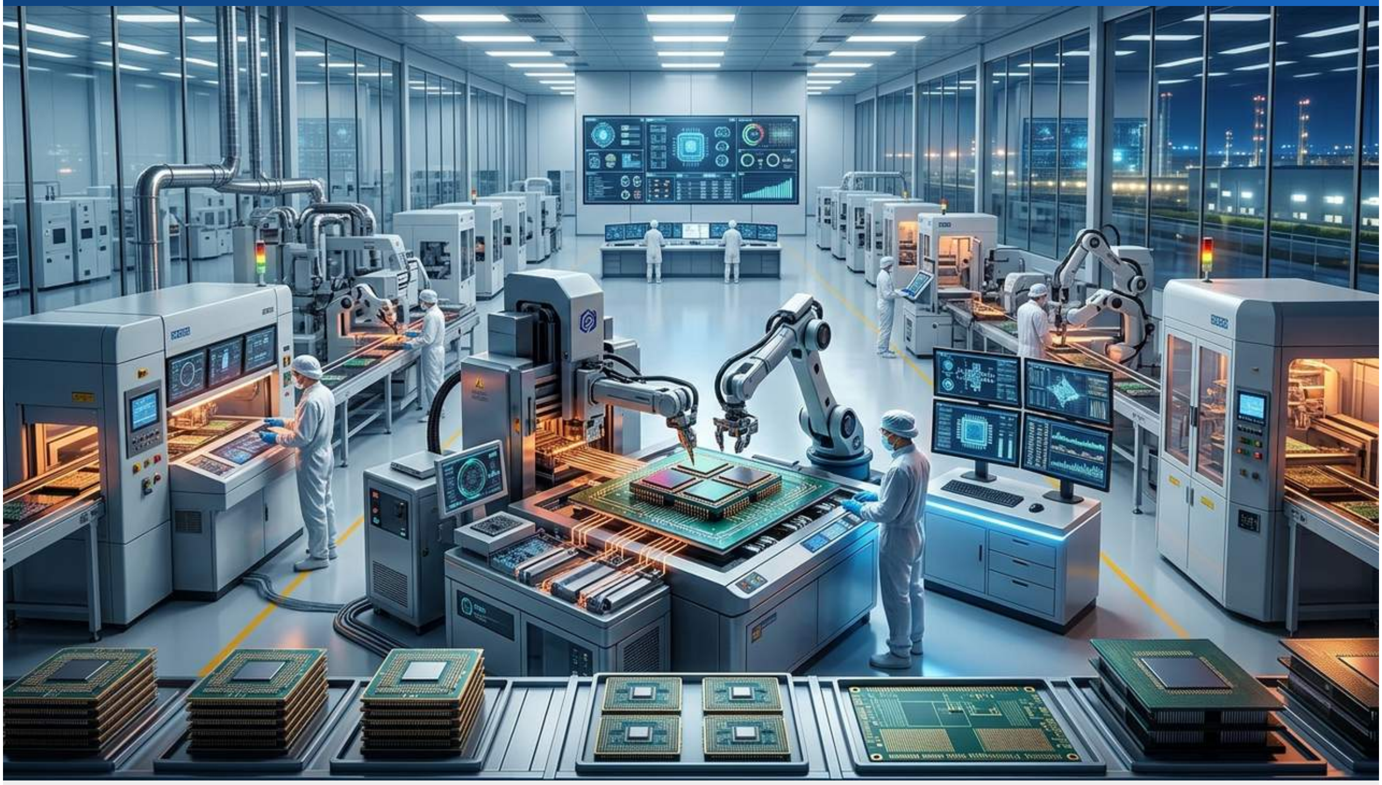
Outlook

Hanmi Semiconductor's leading position in the HBM4 market is expected to directly translate into significant revenue growth alongside the expanding AI and HPC markets. Furthermore, its diversified customer base will enhance resilience against semiconductor market fluctuations, supporting stable long-term growth. The company's technological innovations are also anticipated to contribute to improved HBM production efficiency and cost reduction, benefiting the industry as a whole.

Source: https://www.digitimes.com/news/a20260813VL208/hbm4-hanwha-hanmi-sk-hynix-equipment.html

#06 China Invests 40 Billion Yuan ($5.5 Billion) in New Advanced Packaging Projects for AI/HPC to Prepare for Next Chip Shortage

Published August 14, 2026 All-About-Industries China



OVERVIEW

China's advanced packaging industry is embarking on a new wave of capacity expansion to meet the escalating demand for AI and High-Performance Computing (HPC) chips. Between May and July 2026, approximately 10 major projects were announced, totaling an investment of around 40 billion yuan (approximately $5.5 billion). This substantial capital injection is strategically focused on the most technologically demanding segments of the packaging value chain, aiming to mitigate future chip shortage risks and bolster China's semiconductor industry independence.

IN DEPTH

Key Findings

In a rapid expansion drive, China's advanced packaging industry announced approximately 10 major projects between May and July 2026, committing a total of about 40 billion yuan (approximately $5.5 billion USD) in new investments. This aggressive capacity boost is designed to preempt future semiconductor shortages and specifically targets the technologically demanding segments of the packaging value chain, driven by a surge in demand for AI and High-Performance Computing (HPC) chips.

Technical and Market Details

- The investments are primarily concentrated on cutting-edge technological areas crucial for AI chips, including 2.5D/3D packaging, chiplet integration, and HBM (High Bandwidth Memory) packaging. These technologies deliver superior performance, power efficiency, and integration density unattainable with conventional packaging methods.
- Projects encompass the construction of new manufacturing facilities, upgrades to existing lines, and the establishment of R&D centers. These initiatives are expected to significantly enhance China's self-sufficiency in advanced semiconductor packaging technologies.
- Specifically, AI and HPC chips, with their complex architectures and high power requirements, critically depend on advanced packaging to ensure excellent thermal management and signal integrity. China's current investments are a strategic effort to address these bottlenecks.

Background and Industry Context

Amid escalating geopolitical tensions and supply chain vulnerabilities, nations worldwide are accelerating efforts to strengthen domestic semiconductor manufacturing capabilities. China is no exception, prioritizing "semiconductor self-sufficiency" as a core national strategy and intensifying investments in back-end processes, particularly packaging.

The evolution of AI fundamentally alters both the quality and quantity of semiconductor demand. High-performance AI accelerators and HPC chips, in particular, are challenging to produce without advanced packaging technologies like TSMC's CoWoS. China is accelerating its indigenous technology development and capacity building in anticipation of potential restrictions on access to such advanced technologies. This 40 billion yuan investment clearly signals China's determination to expand its influence in the global AI semiconductor ecosystem and mitigate future supply anxieties.

Outlook

China's substantial investment in advanced packaging is poised to significantly impact the global semiconductor supply chain. Enhanced domestic capacity means Chinese companies will be able to package more AI/HPC chips domestically, potentially altering the competitive balance in international markets. While this contributes to stabilizing AI chip supply, it may also compel some international OSAT companies to redefine their market share strategies. The focus moving forward will be on how these investments translate into tangible technological advancements and increased production capacity.

Source: https://www.all-about-industries.com/china-prepares-for-the-next-chip-shortage-a-a4dec2e5ff0ffc4fe4122089bd938bba/

#07 Hanmi Semiconductor Invests $92 Million in Largest-Ever 8th Plant for AI/HBM Demand, Enters U.S. Market

Published August 18, 2026 Pulse 2.0 South Korea

OVERVIEW

South Korean Hanmi Semiconductor is investing approximately 130 billion won (about $92 million) to construct its largest-ever 8th production facility, a direct response to the explosive demand for AI and High Bandwidth Memory (HBM) manufacturing equipment. The company plans to acquire and refurbish an existing factory in Incheon's Juan National Industrial Complex, with mass production slated for Q2 2027, while also announcing its entry into the U.S. semiconductor market through the establishment of HANMI USA. This strategic expansion aims to significantly bolster its supply capacity for HBM4-related TC bonders and 2.5D packaging equipment, enhancing its ability to serve key clients like NVIDIA and SK Hynix.

IN DEPTH

Key Findings

Hanmi Semiconductor announced an investment of approximately 130 billion won (about $92 million USD) to build its largest-ever 8th production facility, a direct response to the surging global demand for AI and High Bandwidth Memory (HBM) manufacturing equipment. Concurrently, the company revealed its strategic entry into the U.S. semiconductor market with the establishment of HANMI USA, signaling an aggressive move to solidify its leadership in the rapidly expanding AI and HBM sectors.

Technical and Market Details

- The new 8th plant will be established through the acquisition and refurbishment of an existing Mercury factory in Incheon's Juan National Industrial Complex, with mass production slated to commence in the second quarter of 2027. This rapid facility acquisition strategy aims to significantly shorten the time-to-production.
- Key products manufactured at the new facility will include thermal compression (TC) bonders, hybrid bonders, and 2.5D packaging equipment, all indispensable for HBM manufacturing and AI semiconductors. These advanced tools are crucial for enabling the stacking and integration of next-generation memories like HBM4 and complex AI accelerators.
- Hanmi Semiconductor will enhance its lineup of HBM4-related TC bonders and 2.5D packaging equipment to meet demand from leading AI semiconductor players such as NVIDIA and SK Hynix. The establishment of HANMI USA will particularly strengthen customer support and expand market share in the North American region.

Background and Industry Context

The advancement of AI has driven demand for high-performance HBM and sophisticated packaging technologies to unprecedented levels. HBM is a critical component that determines the performance of AI accelerators, and its production capacity often acts as a bottleneck for the overall supply of AI chips. TC and hybrid bonders are essential equipment for precisely bonding these HBM stacks, making the production capacity of equipment manufacturers like Hanmi Semiconductor pivotal for the entire industry's growth.

Amidst global semiconductor supply chain restructuring, various countries, including the U.S., are pushing to strengthen domestic production capabilities. Hanmi Semiconductor's entry into the U.S. market aligns with these geopolitical shifts and the accelerated investment in AI semiconductor-related industries within the U.S. This move is a strategic one for the company to establish a global competitive advantage and build a foundation for long-term growth.

Outlook

This substantial investment and entry into the U.S. market represent a decisive step for Hanmi Semiconductor to cement its position as a leading technology supplier in the AI and HBM sectors. With the new plant commencing operations in Q2 2027, the company's production capacity will dramatically increase, enabling it to meet surging customer demand in a timely manner. This not only contributes to the stabilization of the global AI semiconductor ecosystem supply but also serves as a potent factor for significantly expanding Hanmi's revenue and market share. Furthermore, establishing a U.S. presence harbors potential for future partnerships and technological collaborations.

Source: https://pulse2.com/hanmi-semiconductor-to-invest-91-4-million-in-largest-ever-plant-8-as-ai-chip-equipment-demand-surges/

#08 Amkor Technology Expands U.S. Advanced Packaging Footprint by 67 Acres in Arizona, Bolstering Domestic Manufacturing

Published August 19, 2026 Amkor Technology, Inc. USA

OVERVIEW

Amkor Technology has secured an additional 67 acres (approximately 270,000 square meters) adjacent to its existing advanced packaging and test campus in Arizona, significantly expanding its U.S. back-end semiconductor manufacturing footprint. This strategic expansion aims to address the escalating demand for advanced semiconductor solutions across key markets including AI, high-performance computing, automotive, and communications, thereby bolstering the domestic semiconductor manufacturing supply chain in the United States. Amkor intends to leverage incentives from the U.S. CHIPS Act to accelerate its domestic production capacity build-out.

IN DEPTH

Key Findings

Amkor Technology has acquired an additional 67 acres (approximately 270,000 square meters) of land adjacent to its existing advanced packaging and test campus in Arizona, marking a significant expansion of its U.S. back-end semiconductor manufacturing capabilities. This move is designed to address the increasing demand for advanced semiconductor solutions across rapidly growing markets such as artificial intelligence (AI), high-performance computing (HPC), automotive, and communications.

Technical and Market Details

- The newly secured land provides room for future expansion of manufacturing facilities, preparing Amkor to meet demand for advanced technologies including 2.5D/3D packaging, chiplet integration, and HBM (High Bandwidth Memory) packaging. These technologies are critical for next-generation AI accelerators and HPC chips.
- U.S. government incentives under the CHIPS Act serve as a powerful catalyst for companies like Amkor to expand domestic production capabilities. This investment aligns with the U.S.'s long-term goal of enhancing semiconductor supply chain resilience and strengthening its domestic manufacturing ecosystem.
- Arizona is already developing into a major semiconductor hub with significant investments from multiple chip companies, including TSMC. Amkor's expansion further reinforces this ecosystem, enabling domestically designed chips to be more efficiently manufactured and brought to market through enhanced advanced packaging and test capabilities.

Background and Industry Context

Amidst rising geopolitical risks and supply chain disruptions exacerbated by the COVID-19 pandemic, many nations are pursuing reshoring semiconductor manufacturing. The U.S. enacted the CHIPS Act to foster massive investments in domestic semiconductor R&D and manufacturing. Advanced packaging is increasingly recognized as the final frontier for optimizing semiconductor chip performance, power efficiency, and cost, highlighting its strategic importance.

Megatrends such as AI, data centers, autonomous vehicles, and 5G/6G communications demand higher-performing and more complex semiconductor devices, making state-of-the-art packaging technology indispensable for their efficient production. Independent Outsourced Semiconductor Assembly and Test (OSAT) providers like Amkor are crucial partners for fabless semiconductor companies and IDMs (Integrated Device Manufacturers), and their capacity expansion accelerates overall industry innovation.

Outlook

Amkor Technology's expanded footprint in Arizona is a critical step towards bolstering advanced packaging capabilities in the U.S., significantly contributing to the stabilization of the domestic supply chain. This will enable the U.S. semiconductor industry to more efficiently respond to the high-performance chip demands of the AI era. Furthermore, this investment is expected to lead to job creation and foster technological innovation, positively impacting not only Arizona but the entire U.S. tech ecosystem in the long run.

Source: https://amkortech.gcs-web.com/news-releases/news-release-details/amkor-technology-expands-us-advanced-packaging-footprint

#09 JCET Achieves 79.4% YoY Net Profit Growth in H1 2026, Accelerates Advanced Packaging to Meet AI Demand

Published August 20, 2026 PR Newswire China

OVERVIEW

JCET Group, a leading global outsourced semiconductor assembly and test (OSAT) provider, reported impressive financial results for the first half of 2026, with net profit attributable to shareholders surging by 79.4% year-on-year. As AI redefines computing infrastructure and semiconductor architectures, JCET is aggressively investing in and accelerating its high-end advanced packaging business, including establishing a wholly-owned subsidiary with a registered capital of 4 billion RMB. This performance highlights the strong tailwinds that soaring AI semiconductor demand is creating for the back-end industry.

IN DEPTH

Key Findings

JCET Group, a global leader in outsourced semiconductor assembly and test (OSAT) services, announced a remarkable 79.4% year-on-year increase in net profit attributable to shareholders for the first half of 2026. This strong financial performance is underpinned by the company's accelerated expansion in advanced packaging, as Artificial Intelligence (AI) fundamentally reshapes computing infrastructure and semiconductor architectures. A key initiative includes the establishment of a wholly-owned subsidiary with a registered capital of 4 billion RMB (approximately $550 million USD) to bolster high-end advanced packaging capabilities.

Technical and Market Details

- JCET's substantial net profit growth is primarily driven by its strategic pivot towards high-margin advanced packaging solutions and the escalating demand for chips in AI and High-Performance Computing (HPC) applications. The company demonstrates strengths in technologies such as 2.5D/3D packaging, chiplet integration, flip-chip, and fan-out processes.
- The newly established subsidiary will specialize in the R&D, production, and market deployment of advanced packaging technologies, specifically enhancing capabilities for AI accelerators and high-performance processors for data centers. This enables clients to efficiently mass-produce more complex and higher-performing chip designs.
- This investment further strengthens China's position in the semiconductor industry supply chain. Advanced packaging technologies directly impact chip performance, power consumption, and cost, making self-sufficiency in this sector a crucial national strategic objective.

Background and Industry Context

The AI revolution is fundamentally transforming the semiconductor industry paradigm, escalating the importance of "advanced packaging" for enabling higher computational power and data transfer speeds. As AI chip designs become increasingly complex, 2.5D/3D packaging technologies that integrate chiplets and HBM (High Bandwidth Memory) have become indispensable.

OSAT companies like JCET play a critical role in integrating designed chips into final products, and their technological prowess and production capacity hold immense strategic significance within the global semiconductor supply chain. China, in its pursuit of overall semiconductor self-sufficiency, has been accelerating investments in back-end technologies. JCET's recent growth and investments serve as tangible evidence of the success of this national strategy. Amid rising geopolitical tensions, securing domestic advanced packaging capabilities is critically important for enhancing supply chain resilience.

Outlook

JCET's robust growth and ongoing investment in advanced packaging indicate its continued establishment as a key OSAT provider in the AI era. This enhanced capacity will contribute to the global AI semiconductor supply and further drive technological innovation across the industry. In the long term, the development of China's advanced packaging capabilities is poised to redefine regional balances within the global semiconductor manufacturing ecosystem, creating new axes of competition. JCET's future technological developments and customer acquisition strategies will be closely watched.

Source: https://www.prnewswire.com/apac/news-releases/jcet-reports-79-4-yoy-growth-in-h1-2026-net-profit-attributable-to-shareholders-accelerates-advanced-packaging-expansion-302856604.html

#10 PackCon 2026 to Discuss How Sustainable Packaging Drives Business Value

Published August 26, 2026 EuroCham Singapore Singapore

OVERVIEW

Scheduled for August 26, 2026, in Singapore, PackCon 2026 is an international event dedicated to exploring how sustainable packaging drives business value. Industry leaders, policymakers, sustainability experts, and packaging practitioners will convene to discuss fostering innovation beyond regulatory compliance and strengthening supply chain resilience. Attendees are expected to gain practical insights into balancing environmental responsibility with economic benefits.

IN DEPTH

Key Findings

PackCon 2026 is an international conference focusing on the pressing issue of how sustainable packaging can drive business value. This event provides a crucial platform to strengthen the industry's commitment to sustainability and explore innovative solutions.

Event Details

- Date: August 26, 2026
- Location: Singapore
- Key Participants: Industry leaders, policymakers, sustainability experts, and packaging practitioners.
- Discussion Focus: Promoting innovation beyond regulatory compliance, enhancing supply chain resilience, and the role of packaging in the transition to a circular economy.

Background and Industry Context

In today's business landscape, reducing environmental impact and prioritizing sustainability are not merely corporate social responsibilities (CSR) but essential elements for establishing competitive advantage. The packaging industry is no exception, facing strong demands from consumers and regulators for recyclability, sustainable materials, and waste reduction. Against this backdrop, PackCon 2026 aims to discuss the challenges and opportunities facing the industry and translate discussions into concrete actions.

Outlook

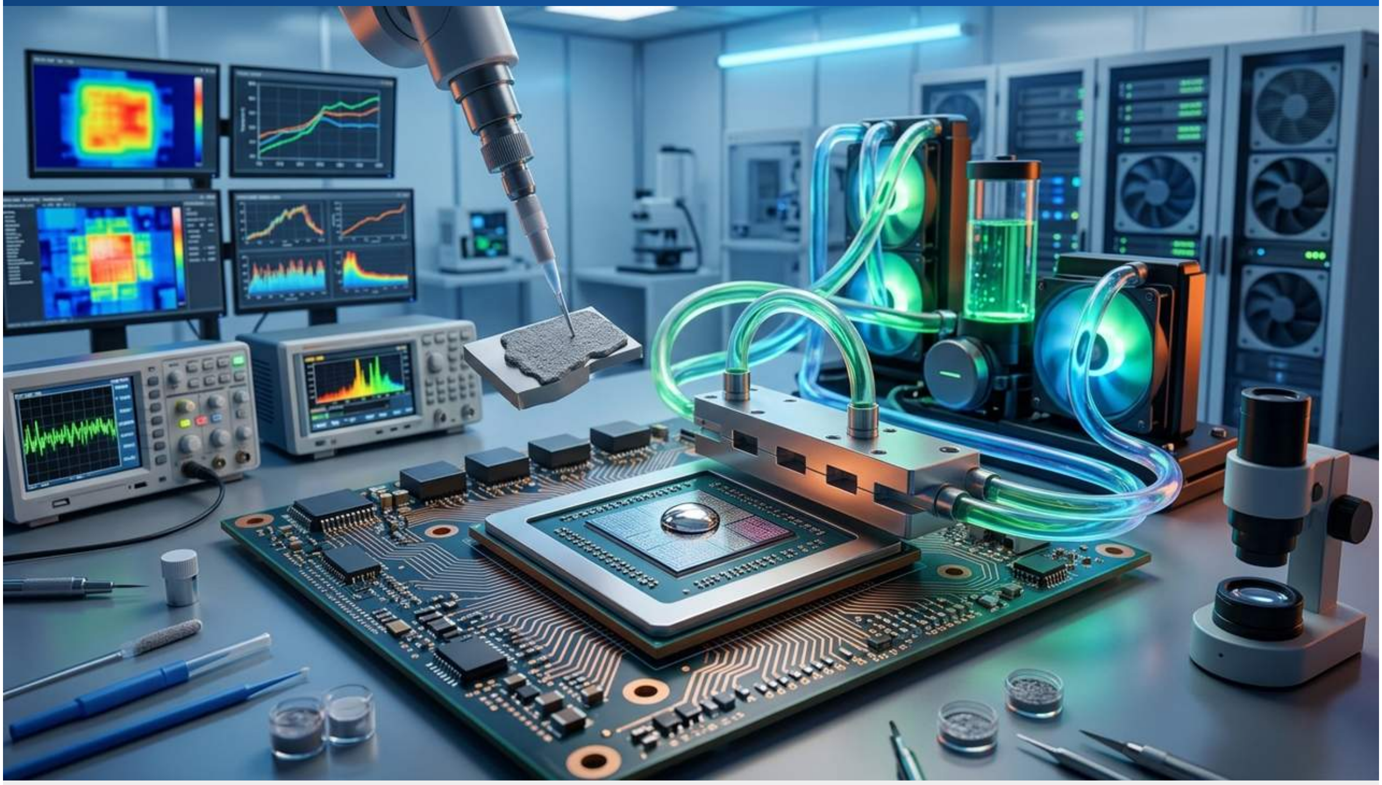
The insights gained at PackCon 2026 will serve as valuable guidance for participating companies in developing and implementing sustainable packaging strategies. This is expected to contribute to reducing environmental footprints while simultaneously enhancing brand image, gaining consumer loyalty, and ultimately fostering sustainable business growth. The event holds the potential to create new partnerships and collaborations, accelerating the packaging industry's overall transition towards sustainability.

Source: https://eurocham.org.sg/event/packcon-2026/

Collected: August 21, 2026 | Automated Research System (Gemini API)

#11 Advanced Thermal Interface Materials Evolve to Combat AI Chip Heat, Spanning Liquid Metals to Polymer Composites

Published August 15, 2026 Exponential Industry USA



OVERVIEW

Thermal Interface Materials (TIMs) are becoming indispensable for semiconductor thermal management, addressing the escalating power density and heat generation in AI processors. Current packaging relies on polymer composites filled with BN, alumina, or CNTs, alongside metal/liquid metal alloys such as Ga-In-Sn and indium solder. AI workloads introduce new mechanical failure modes like liquid metal pump-out, galvanic corrosion on aluminum, viscosity limitations in polymer fillers, and die contact issues from 2.5D/3D package warpage. Resolving these challenges with innovative TIMs capable of efficiently dissipating heat from high-power AI chips approaching 1,000W is critically urgent.

IN DEPTH

Key Findings

Thermal Interface Materials (TIMs) play an indispensable role in semiconductor thermal management, facilitating efficient heat transfer from AI processors, High-Bandwidth Memory (HBM) stacks, and high-power packages to heat spreaders or cold plates. Contemporary AI packaging solutions primarily utilize silicone-based polymer composites, often filled with boron nitride (BN), alumina, or carbon nanotubes (CNTs), alongside metal/liquid metal alloys like gallium-indium-tin (Ga-In-Sn) and indium solder. However, AI workloads present unique challenges, including liquid metal pump-out phenomena, galvanic corrosion on aluminum components, viscosity limitations in polymer composites due to filler loading, and die contact failures caused by warpage in 2.5D/3D packages. These emerging mechanical failure modes necessitate urgent innovation in TIMs to reliably dissipate heat from high-power AI chips, which are rapidly approaching 1,000W.

Technical Details

The primary function of TIMs is to fill microscopic gaps between heat-generating components and heat-sinking surfaces, thereby reducing thermal resistance and enhancing heat transfer efficiency. High-power AI chips dissipate high heat fluxes, averaging 300 W/cm^2 and reaching 500–1,000 W/cm^2 in localized hotspots, demanding TIMs with exceptionally high thermal conductivity and reliability. Existing polymer composites face challenges with increased viscosity and difficulty in application uniformity as filler content rises. While liquid metals offer superior thermal conductivity, concerns exist regarding pump-out phenomena (leakage from the interface during thermal cycling) and galvanic corrosion with certain metals (e.g., aluminum). These issues directly impact long-term reliability and yield, prompting exploration into new material compositions, structural designs, such as film-based TIMs, and more stable alloy developments.

Background & Context

Semiconductor technology continues its trajectory towards higher power density, smaller package sizes, faster processing speeds, and increased integration, making thermal management a paramount challenge in semiconductor engineering. The rapid advancements in AI computing, GPUs, CPUs, and high-performance processors have created increasingly stringent thermal demands. TIMs, once considered mere commodity consumables, have now transformed into critical rate-limiting factors in electronic design. The thermal crisis in AI data centers is vigorously driving innovation across comprehensive thermal management solutions, including TIMs at the package level, heat spreaders, cold plates, and even immersion cooling. This environment fosters collaboration among TIM manufacturers, packaging companies, and chip designers across the entire supply chain.

Strategic Significance & Outlook

As the demands of AI workloads continue to escalate, the performance and reliability of TIMs will become even more crucial in overcoming AI hardware bottlenecks. Future TIMs will need to offer not only high thermal conductivity but also excellent long-term stability, superior dispensability, and robust interfacial adhesion between dissimilar materials. Innovative approaches are anticipated, including advanced combinations of thermally conductive fillers and polymer matrices, applications of nanomaterials, and even self-healing TIMs. These advancements are expected to enable higher-performance, more reliable AI systems, forming a foundational pillar for the continued proliferation and development of AI technologies.

Source: https://exponentialindustry.com/blog/2026-08-14-thermal-interface-materials-ai-hardware-scaling/

#12 Applied Materials Raises Advanced Packaging Revenue Forecast to Over 70% Growth on AI Demand, Unveils New HBM Systems

Published August 14, 2026 TrendForce USA

OVERVIEW

Applied Materials has significantly revised its advanced packaging revenue forecast for 2026 to over 70% year-over-year growth, a 20-percentage-point increase in just three months, driven by soaring AI semiconductor investments. The company introduced the Nokota™ VMax™ 2 ECD system and six new systems designed for HBM and advanced packaging applications. This strategic expansion is capturing increased investment in HBM and 3D packaging, with DRAM revenue, including HBM packaging, surging 52% year-over-year in Q3 FY2026, reflecting AI accelerators' expanding memory requirements.

IN DEPTH

Key Findings

Applied Materials has revised its 2026 forecast for advanced packaging revenue, projecting an increase of over 70% year-over-year, driven by robust investments in AI semiconductors. This represents a substantial 20-percentage-point upward revision from its prior forecast of over 50% growth, announced just three months earlier. This acceleration is fueled not only by front-end miniaturization for AI semiconductors but also by surging investments in High-Bandwidth Memory (HBM) and 3D packaging, which connects multiple dies. To capitalize on this expanded market opportunity, Applied Materials has introduced a suite of six new systems for DRAM and advanced packaging, including the Nokota™ VMax™ 2 ECD system, Centura Prime Epi, Producer Avila 2 PECVD, Opta Quad CMP, VeritySEM 7AP, and SEMVision G7AP.

Technical Details

Modern AI processors are increasingly limited by the data transfer speed between computing and memory. Advanced packaging overcomes this bottleneck by bringing compute and memory closer together, thereby accelerating data transfer and improving energy efficiency. Applied Materials' newly unveiled Nokota™ VMax™ 2 ECD system is an electroplating deposition (ECD) tool specifically engineered to meet the complex demands of HBM packaging. ECD is a critical process for forming ultra-fine copper interconnects and via fills, essential for creating high-density interconnections within HBM stacks. Furthermore, Applied Materials leverages its existing front-end technologies, adapting them to provide a comprehensive range of process solutions—including etching, thin-film deposition, Chemical Mechanical Planarization (CMP), and inspection & metrology—that enhance yield in DRAM manufacturing and advanced packaging. The 52% year-over-year increase in DRAM revenue, inclusive of HBM packaging, during Q3 FY2026 underscores the direct impact of surging AI accelerator demand on the memory market.

Background & Context

The rapid evolution of AI is driving a structural transformation across the semiconductor industry, establishing advanced back-end packaging as a primary driver for performance enhancement, beyond conventional front-end process miniaturization. Heterogeneous integration approaches, such as HBM and 2.5D/3D chip stacking, dramatically boost AI chip performance but also increase manufacturing complexity and cost. Applied Materials, as a leading semiconductor equipment manufacturer, focusing on advanced packaging and expanding its product portfolio, confirms that this market growth is a long-term trend rather than a temporary surge. The company views this escalating demand as an opportunity to broaden the applicability of its existing technologies and is actively pursuing strategies to capture the rising adoption of HBM and 3D packaging.

Strategic Significance & Outlook

Applied Materials' strong growth projections and new product introductions indicate that the advanced packaging market will continue to expand in tandem with AI technology advancements. The further proliferation of HBM and 3D packaging technologies will introduce more intricate package structures and stringent yield requirements, making ongoing innovation in inspection & metrology, process control, and materials technology critically important. By swiftly adapting to these market shifts, Applied Materials is poised to further solidify its position as a central supplier within the AI-era semiconductor ecosystem. Its technologies are expected to play an increasingly vital role, particularly in data center and edge computing sectors demanding high-performance AI chips.

Source: https://xenospectrum.com/en/applied-materials-packaging-growth/

#13 SK Hynix Breaks Ground on $3.87 Billion Advanced Packaging Plant in Indiana for HBM Production

Published August 13, 2026 The Korea Herald South Korea

OVERVIEW

SK Hynix is set to hold a groundbreaking ceremony this month for a $3.87 billion advanced chip packaging plant in Indiana, intensifying its U.S. presence in AI chip production. The facility, near Purdue University, will focus on advanced packaging and R&D for High-Bandwidth Memory (HBM), with mass production slated for late 2028. The U.S. government has pledged up to $450 million in direct funding and $500 million in loans via the CHIPS Act. This move is critical for global supply chain restructuring amidst explosive AI chip demand.

IN DEPTH

Key Findings

SK Hynix is scheduled to hold a groundbreaking ceremony on August 27th for a new advanced chip packaging plant in Indiana, representing a substantial investment of $3.87 billion (approximately 5.3 trillion Korean Won). This significant strategic investment underscores the company's commitment to strengthening its presence in AI chip production within the United States. The facility, to be located near Purdue University, will house advanced packaging capabilities specifically for High-Bandwidth Memory (HBM) and dedicated research and development facilities. Mass production is projected to commence in the second half of 2028, supported by up to $450 million in direct funding and $500 million in loans from the U.S. government under the CHIPS Act.

Technical Details

HBM is an indispensable memory solution for maximizing the performance of AI processors, characterized by its vertical stacking of multiple DRAM dies and a high-speed, wide-bandwidth interface. Its manufacturing necessitates advanced packaging technologies distinct from conventional memory. Key technical challenges include precise die-to-die bonding, sophisticated thermal management, and ensuring signal integrity across multiple layers. The SK Hynix Indiana plant is slated to implement state-of-the-art packaging processes designed to address these HBM-specific requirements. This is expected to significantly enhance HBM product yields and expand production capacity, directly supporting the increasing demand for AI chips.

Background & Context

The explosive demand for AI has highlighted bottlenecks in advanced memory, including HBM, and the packaging technologies that support it. Governments worldwide have prioritized strengthening semiconductor supply chains and securing domestic production capabilities, with the U.S. CHIPS Act serving as a prime example. SK Hynix's investment in the U.S. is not merely an expansion of production capacity but also a strategic move to diversify geopolitical risks and demonstrate deeper commitment to the American market. This is anticipated to stabilize supply for key U.S. AI semiconductor customers, contributing to the overall development of the AI ecosystem. The co-located R&D facilities will also bolster the company's capability to drive future HBM technological innovations.

Strategic Significance & Outlook

The operationalization of this new facility will further solidify SK Hynix's leadership in the HBM market and reinforce Korea's prominent position in the global AI semiconductor supply chain. The start of mass production in late 2028 marks a crucial milestone for supporting the proliferation of next-generation AI models and applications. Furthermore, the CHIPS Act funding may incentivize other semiconductor companies considering similar investments, accelerating the development of an advanced semiconductor manufacturing ecosystem in the U.S. As HBM technology is expected to continue evolving towards higher stacking and faster speeds, the Indiana plant will serve as a strategic hub to meet future AI computing needs.

Source: https://www.koreaherald.com/article/10840321

#14 ABF Substrate Shortages Projected Through 2028 Amid AI Boom; Taiwanese, Japanese, Korean Manufacturers Secure Orders Until 2030

Published August 16, 2026 digitimes Taiwan

OVERVIEW

The global AI computing infrastructure boom is rapidly escalating demand for GPUs, CPUs, and ASICs, leading to projected ABF (Ajinomoto Build-up Film) substrate shortages starting in 2026 and worsening through 2027-2028. Consequently, leading IC substrate manufacturers in Taiwan, Japan, and Korea have reportedly secured orders extending to 2029-2030. Companies including Ibiden, Unimicron, Kinsus, Nan Ya Printed Circuit Board, Leading, and Samsung Electro-Mechanics are embarking on new rounds of capacity expansion to meet this unprecedented demand.

IN DEPTH

Key Findings

The global surge in AI computing infrastructure is driving a rapid increase in demand for high-performance processors such as GPUs, CPUs, and ASICs. As a direct consequence, the ABF (Ajinomoto Build-up Film) substrate industry is projected to face supply shortages beginning in 2026, with the deficit expected to deepen through 2027 and 2028. In response to this, major IC substrate manufacturers across Taiwan, Japan, and Korea have reportedly secured order visibility extending as far as 2029-2030. To address this unprecedented demand, companies including Ibiden, Unimicron, Kinsus, Nan Ya Printed Circuit Board, Leading, and Samsung Electro-Mechanics have initiated new rounds of equipment expansion investments.

Technical Details

ABF substrates are crucial insulating films used in the packaging of high-performance logic ICs, such as CPUs, GPUs, and ASICs, and are indispensable for advanced packaging processes involving multiple layers and fine pitch interconnections. As AI chips demand larger packages and higher integration densities, ABF substrates require more layers and greater surface area, leading to increased consumption. For instance, 2.5D/3D packaging incorporating High-Bandwidth Memory (HBM) necessitates complex routing patterns to connect multiple chips and a robust substrate structure to support them. ABF materials play a vital role in achieving both fine circuit formation and high electrical performance.

Background & Context

ABF substrate shortages previously occurred between 2021 and 2022, with supply falling approximately 20% short of demand. While new capacity coming online in 2023 was expected to alleviate the shortage temporarily, the current explosion in AI demand is consuming ABF substrates at a far greater pace. This shortage represents an underestimated yet critical bottleneck in the AI chip supply chain, potentially limiting the output of CPUs, GPUs, and network silicon even when sufficient die capacity exists. Ajinomoto's near-monopoly, holding approximately 95% of the global ABF market, exacerbates the severity of the supply issue.

Strategic Significance & Outlook

The ABF substrate shortage is likely to impact AI chip production schedules and drive up prices in the short term. However, the substantial capital expenditures by various manufacturers are expected to improve supply capabilities in the medium to long term. As companies in Taiwan, Japan, and Korea accelerate their investments, ABF substrate production capacity is anticipated to increase gradually. Nevertheless, depending on the continued growth of demand, tight supply conditions may persist. This situation will further strengthen collaborative relationships between material suppliers and IC substrate manufacturers, encouraging strategic investments to enhance the resilience of the entire supply chain.

Source: https://vertexaisearch.cloud.google.com/grounding-api-redirect/AUZIYQHZXZok3wye6KA24fw6VNEgL6lY1euXfkXgjnxggUBUxYWJK1bty_pObL-1z-GHMW3UMHRXO8vNCruNLih6TCEO01Ep9fCoEMiAUvYxVyf_KJJQPaOlxCH9-Hhxp1oj9bbgMt0SV96To-N5bL4pr19MoKnLl7rCMJyCQW_jnRjm2Q6Q8Hyd830Ch9zuyWOqjG8Uo4lD_23cuMuNC-Y6tGelULWp4QzO

#15 Semiconductor Inspection Equipment Market to Reach $13.4 Billion by 2034, KLA Leads in Advanced Packaging Process Control

Published August 16, 2026 Exponential Industry USA

OVERVIEW

The semiconductor inspection equipment market is projected to grow at a 7.9% CAGR from 2026 to 2034, reaching $13.4 billion, driven by increasing AI chip complexity and advanced packaging adoption. KLA is leading in advanced packaging process control, with related revenue up approximately 70% YoY, establishing back-end and mid-end inspection as distinct budget items. Hybrid bonding and 2.5D/3D chip stacking necessitate new tools like X-ray CT, scanning acoustic microscopy, and 3D optical profiling beyond traditional front-end suites. Testing and metrology now play a strategic role in determining AI chip yield, reliability, and supply chain competitiveness.

IN DEPTH

Key Findings

The semiconductor inspection equipment market is projected to expand at a Compound Annual Growth Rate (CAGR) of 7.9% from 2026 to 2034, reaching a market value of $13.4 billion by 2034. This growth is primarily fueled by the increasing complexity of AI chips and the rapid adoption of advanced packaging technologies. KLA is a frontrunner in advanced packaging process control, reporting approximately 70% year-over-year revenue growth in this segment, indicating that back-end and mid-end inspection are becoming independent budget items for OEMs and fab operators. Testing and metrology for AI chips are no longer confined to final production pass/fail decisions; they now play a strategic role in determining yield, reliability, and supply chain competitiveness.

Technical Details

Advanced packaging techniques such as hybrid bonding, fan-out wafer-level packaging, and 2.5D/3D chip stacking necessitate the inspection of bonding pads at extremely fine pitches, often as small as 1–2 micrometers. To address these stringent requirements, advanced inspection tools—including X-ray Computed Tomography (CT), Scanning Acoustic Microscopy (SAM), and 3D optical profiling tools—are being adopted, extending beyond the capabilities of traditional front-end inspection suites. These technologies are crucial for non-destructively detecting hidden defects within interconnects, redistribution layers (RDLs), vias, and interfaces. Companies like Applied Materials and Onto Innovation also offer process control solutions that combine optical inspection, electron-beam inspection, defect review, metrology, data analytics, and AI-based approaches to enhance yield management and process optimization. KLA Corporation, in particular, stands as one of the most significant global suppliers with comprehensive capabilities spanning optical inspection, e-beam inspection, defect review, metrology, and process control analysis.

Background & Context

The evolution of AI and High-Performance Computing (HPC) applications is accelerating the shift towards larger, denser, and higher-value advanced packages, including emerging glass panel substrate technologies. With this increasing package complexity, reliability risks often arise from hidden defects within interconnections, RDLs, vias, and interfaces—defects that are difficult to access through optical inspection or electrical pass/fail tests alone. Terry Tsao, Global CMO and President of SEMI Taiwan, emphasizes that as AI chip value and complexity grow, testing and metrology become increasingly indispensable for determining yield, managing costs, and enabling efficient mass production. KLA is projected to reach $1 billion in revenue from its advanced packaging process control business in fiscal year 2026, solidifying its market position.

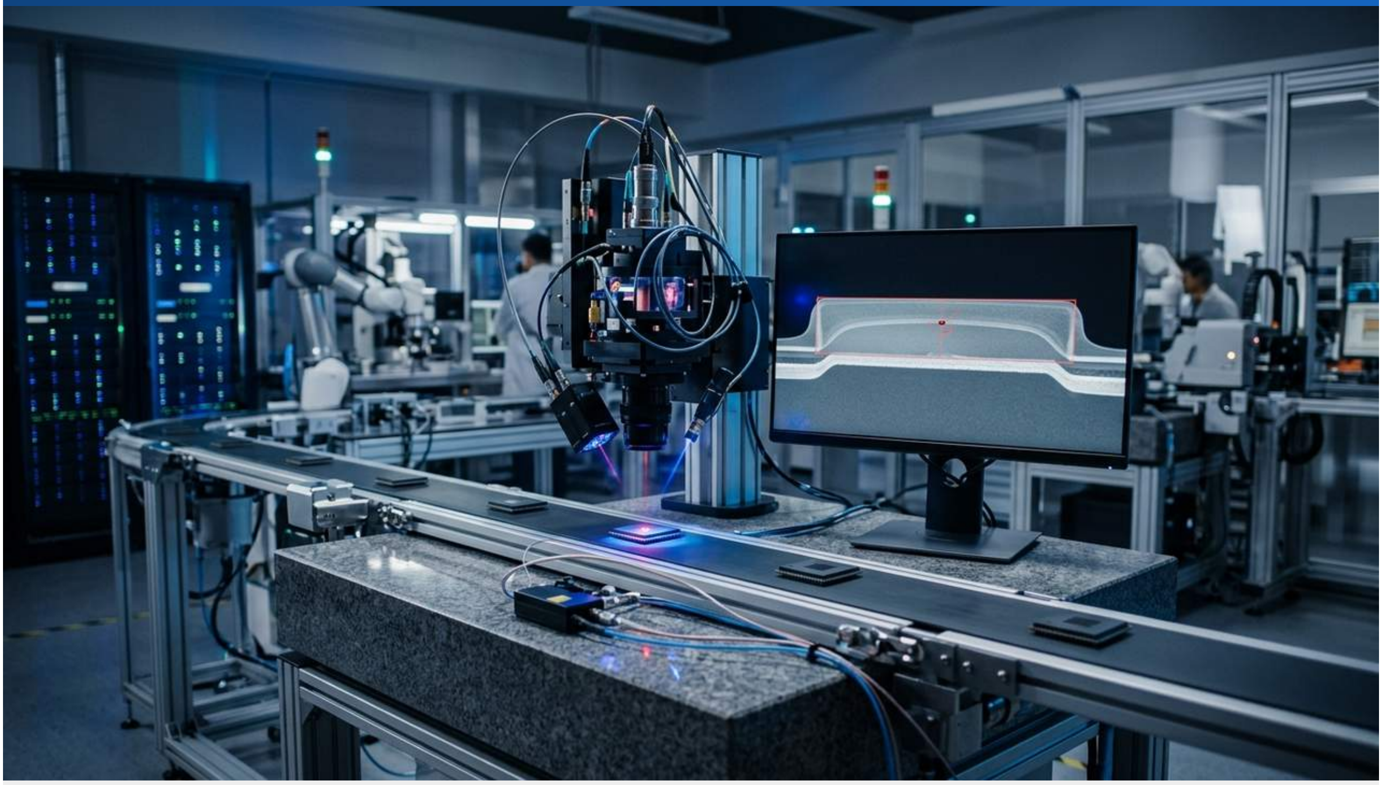
Strategic Significance & Outlook

The continued growth of the semiconductor inspection equipment market reflects the escalating need for quality and reliability in AI-era semiconductor manufacturing. The adoption of advanced techniques like X-ray CT and SAM is expected to expand, with further advancements in real-time, in-line inspection capabilities. Moreover, inspection systems are increasingly integrating AI and data analytics to improve the accuracy of defect classification and streamline process optimization. This enables chip manufacturers to identify issues more rapidly, implement corrective actions, and mitigate the rising production costs associated with advanced packaging complexity, ultimately reducing time-to-market. In the future, inspection and metrology technologies are poised to be recognized as one of the most strategic elements in AI semiconductor manufacturing.

Source: https://siliconsemiconductor.net/article/125162/Semiconductor_Inspection_Equipment_set_for_79_CAGR_growt

#17 Fraunhofer IKTS Achieves Real-Time Detection of 8μm Packaging Seal Defects Using Optical Coherence Tomography (OCT)

Published August 13, 2026 Fraunhofer-Gesellschaft Germany



OVERVIEW

Researchers at Fraunhofer IKTS have developed an innovative inspection system based on Optical Coherence Tomography (OCT), successfully enabling continuous, real-time, and non-destructive detection of packaging seal defects down to 8 micrometers during the packaging process. This system can non-destructively test packaging seal quality in real-time even on high-speed production lines operating at up to 25 meters/minute. The technology is applicable for inspecting transparent and semi-transparent materials, with broad industrial quality assurance uses ranging from medical technology to functional surfaces and industrial 3D printing.

IN DEPTH

Key Findings

A team of researchers at Fraunhofer IKTS (Institute for Ceramic Technologies and Systems) has developed a groundbreaking inspection system utilizing Optical Coherence Tomography (OCT), successfully achieving continuous, real-time, and non-destructive detection of minute seal defects, down to 8 micrometers (μm), during the packaging process. This innovative system boasts the capability to assess packaging seal quality non-destructively and in real-time, even on high-speed production lines operating at up to 25 meters per minute. The technology is particularly adept at inspecting transparent and semi-transparent materials, making it broadly applicable for quality assurance across diverse industrial sectors, including medical technology, functional surface evaluation, and industrial 3D printing.

Technical Details

Optical Coherence Tomography (OCT) is a non-invasive imaging technique that uses light interference to visualize the internal structure of objects. This system illuminates the package with near-infrared light and analyzes the phase difference of the reflected light to detect internal defects, such as micro-cracks, voids, delaminations, or incomplete seal areas, with high precision. The 8-micrometer detection accuracy is crucial for identifying subtle flaws often missed by conventional visual or X-ray inspection methods. The ability for real-time, in-line inspection allows for problem identification at early stages of the production process, enabling swift corrective actions, preventing defective products from entering the supply chain, and significantly improving production yield.

Background & Context

In modern manufacturing, particularly in the semiconductor and medical device sectors, product reliability and safety are paramount. The quality of the packaging process directly impacts the performance and lifespan of the final product, leading to increased demand for advanced inspection technologies. Traditional quality control methods predominantly involved post-production sampling or destructive testing, which are time-consuming, costly, and make comprehensive inspection challenging. The OCT-based system developed by Fraunhofer IKTS overcomes these limitations by offering an in-line inspection solution that can be directly integrated into the production line. This aligns with Industry 4.0 principles, contributing to the realization of smart factories.

Strategic Significance & Outlook

This OCT-based inspection system is expected to play a particularly critical role in quality control for advanced packaging in semiconductor back-end processes. In high-density integrated circuits and heterogeneous integration packages, minute defects can lead to catastrophic failures, making real-time inspection at the 8-micrometer level indispensable for improving yield and ensuring reliability. Furthermore, its application will expand to various industries requiring stringent quality standards, such as medical packaging, food and pharmaceutical packaging, and even automotive components. In the future, by combining with AI, more advanced self-learning inspection systems capable of automatically identifying defect types and causes, and optimizing process parameters in real-time, are also anticipated.

Source: https://vertexaisearch.cloud.google.com/grounding-api-redirect/AUZIYQGixqURvV0fIq8d4Zn0GhaEpk2C_Gqt_GWxYW91XDqYyztsYcf54pM1XrCO1PVgYXSI1GVZn4GWFI
tOIjvJS1TDnyCxZlhqiXaja29jcrK-IRsNHkRzVfOuIlvSWDv3iW0gjsGm7mN1xU4jXAtwmmkUYPZhmz3shjZYKgvJrEupsp-33UlpPA21OkTtjVQXqioHfjCaqLJ7suZg=

#18 STMicroelectronics Maintains $2 Billion Investment Amid Net Loss, Bolstering SiC, 300mm Fabs, and Advanced Packaging

Published August 19, 2026 Seeking Alpha Switzerland

OVERVIEW

Despite reporting a net loss in the first half of 2026, STMicroelectronics (STM) plans to maintain its net capital expenditure near the upper end of the $2-2.2 billion range for the year, focusing on Silicon Carbide (SiC), 300mm wafer fabs, and advanced packaging. The company forecasts data center revenues to exceed $1 billion in 2026 and significantly surpass $2 billion in 2027, anticipating these investments will drive future growth. This strategy targets high-growth areas including MEMS, AI data centers, RF, analog, power, and microcontroller devices, notably establishing a panel-level packaging pilot line in Toulouse, France, in 2025.

IN DEPTH

Key Findings

STMicroelectronics (STM) has announced its intent to maintain its net capital expenditure near the upper limit of the $2-2.2 billion range for 2026, despite reporting a net loss in the first half of the year. This strategic investment prioritizes growth areas, specifically Silicon Carbide (SiC) based products, 300mm wafer manufacturing fabs, and advanced packaging technologies. The company projects its data center revenues to exceed $1 billion in 2026 and substantially surpass $2 billion in 2027, underscoring its belief that these investments are critical for future revenue expansion. Notably, STMicroelectronics has established a panel-level packaging pilot line in Toulouse, France, in 2025, specifically for RF, analog, power, and microcontroller devices, enhancing its advanced packaging capabilities.

Technical Details

Advanced packaging is a critical technology for improving semiconductor chip performance, power efficiency, and integration density. Its value is increasingly evident in complex System-on-Package (SoP) and chiplet integration required for AI, high-performance computing, automotive, and IoT applications. STMicroelectronics' focus on Panel-Level Packaging (PLP) offers the potential for improved production efficiency and reduced costs compared to traditional wafer-level packaging, by utilizing larger substrate areas. PLP allows for tighter integration of multiple dies and high-speed, short-distance interconnections, optimizing performance and footprint, particularly for heterogeneous integration devices combining MEMS sensors or analog circuits with digital processors. Investments in SiC technology bolster the company’s competitiveness in power semiconductors for electric vehicles (EVs) and industrial applications, while 300mm fab investments aim to reduce per-chip costs and expand production capacity through larger wafer sizes.

Background & Context

The semiconductor industry is entering a new growth phase driven by AI and high-performance computing demand, which inherently requires substantial capital investments. The decision by companies like STMicroelectronics to maintain and strengthen investments despite temporary losses reflects a strong commitment to long-term market trends and securing a competitive edge. SiC and advanced packaging are particularly strategic sectors supporting future technological advancements in data centers, automotive electrification, and industrial automation. Industry-wide, investments in back-end processes are a major trend, with KLA, for example, expanding its advanced packaging process control business and expecting related revenues to reach $1 billion in fiscal year 2026. STMicroelectronics' aggressive investment in these areas aims to maintain and expand its leadership across diverse market segments.

Strategic Significance & Outlook

STMicroelectronics' strategic investments are poised to play a crucial role in establishing its position as a leading semiconductor supplier in the AI era. Continued investment in SiC products, 300mm fabs, and especially advanced packaging technologies will enable the company to capitalize on megatrends such as enhanced data center performance, widespread EV adoption, and the development of smart industries. Advancements in panel-level packaging technology are expected to accelerate the realization of smaller, higher-performance, and more cost-efficient devices, contributing to reduced power consumption and the creation of new applications. The projection of data center revenues far exceeding $2 billion by 2027 indicates that these investments are not merely for short-term revenue contributions but serve as powerful drivers for medium to long-term growth.

Source: https://vertexaisearch.cloud.google.com/grounding-api-redirect/AUZIYQFI25DaDPTSx2epvXxv6crxD0S7_nCGA-AoAKFg44IHzK6evda3OMlv6OmNptPovSq188yNeu-5epC4QZtIwyMb_ggZTEcVvyZIdrmmiYFUFN4CIIeO67JtHLDMlDJIXVxmz3YA3kBkzSnLRCgp1G_O3hqtlnkVMhLRu

#19 Japan's Shinko Electric Develops 22-Layer Glass Substrates for AI Chips, Resolving Internal Cracking and Delamination Issues

Published August 18, 2026 TrendForce Japan

OVERVIEW

As AI chips demand larger packages, intensifying competition in glass substrates, Japan's Shinko Electric Industries has successfully developed 22-layer glass substrates with 11 copper wiring layers on each side. This innovation addresses major challenges in glass substrate manufacturing, specifically internal cracking and delamination (SeWaRe issues), and was showcased as the latest glass core substrate at the Advanced Packaging Summit 2026. With Korean companies also vying for early dominance, glass substrates are gaining global attention as a next-generation AI packaging material.

IN DEPTH

Key Findings

As AI chips increasingly demand larger and more complex packages, the development race for glass substrates as a next-generation packaging material is intensifying. In this competitive landscape, Japan's Shinko Electric Industries has successfully developed a 22-layer glass substrate, featuring 11 copper wiring layers laminated on each side of the glass core. This significant technological breakthrough directly addresses a major challenge in multi-layer glass substrate manufacturing: internal cracking and delamination, commonly referred to as the SeWaRe issue. Shinko Electric Industries showcased this cutting-edge glass core substrate at the Advanced Packaging Summit 2026 in July, demonstrating its advanced technological capabilities to the global industry.

Technical Details

Multi-layer glass substrates are essential for achieving the high-density interconnections required by AI chips. However, a significant challenge arises from the tendency for internal stresses, caused by laminating multiple layers of materials with different coefficients of thermal expansion, to induce cracks and delamination. Shinko Electric Industries' 22-layer glass substrate is believed to incorporate proprietary material design and process technologies to overcome this SeWaRe issue. Key aspects likely include careful selection of the glass core, optimization of material compatibility between copper wiring layers and dielectric layers, and precise control of temperature profiles and pressure during lamination. This allows for the production of highly reliable package substrates that maintain excellent dimensional stability and electrical properties, delivering the high bandwidth and low power loss necessary for advanced AI chips. Glass substrates also offer superior surface flatness compared to existing organic substrates, benefiting fine-pitch wiring pattern formation and precise chiplet placement.

Background & Context

High-performance AI processors increasingly adopt 2.5D/3D packaging that integrates numerous chiplets, including High-Bandwidth Memory (HBM). Such complex structures demand substrates with exceptional thermal stability, signal integrity, and mechanical strength. Conventional organic substrates are nearing their limits in terms of warpage and wiring density, hindering further evolution of AI chips. Glass substrates are emerging as a promising solution to these challenges, with major players like Intel and SKC also intensifying their development efforts, leading to vibrant global technological competition. Shinko Electric Industries' latest achievement, particularly in multi-layer technology, demonstrates Japan's strong competitive edge in materials technology, reinforcing Japan's role in the next-generation AI chip supply chain.

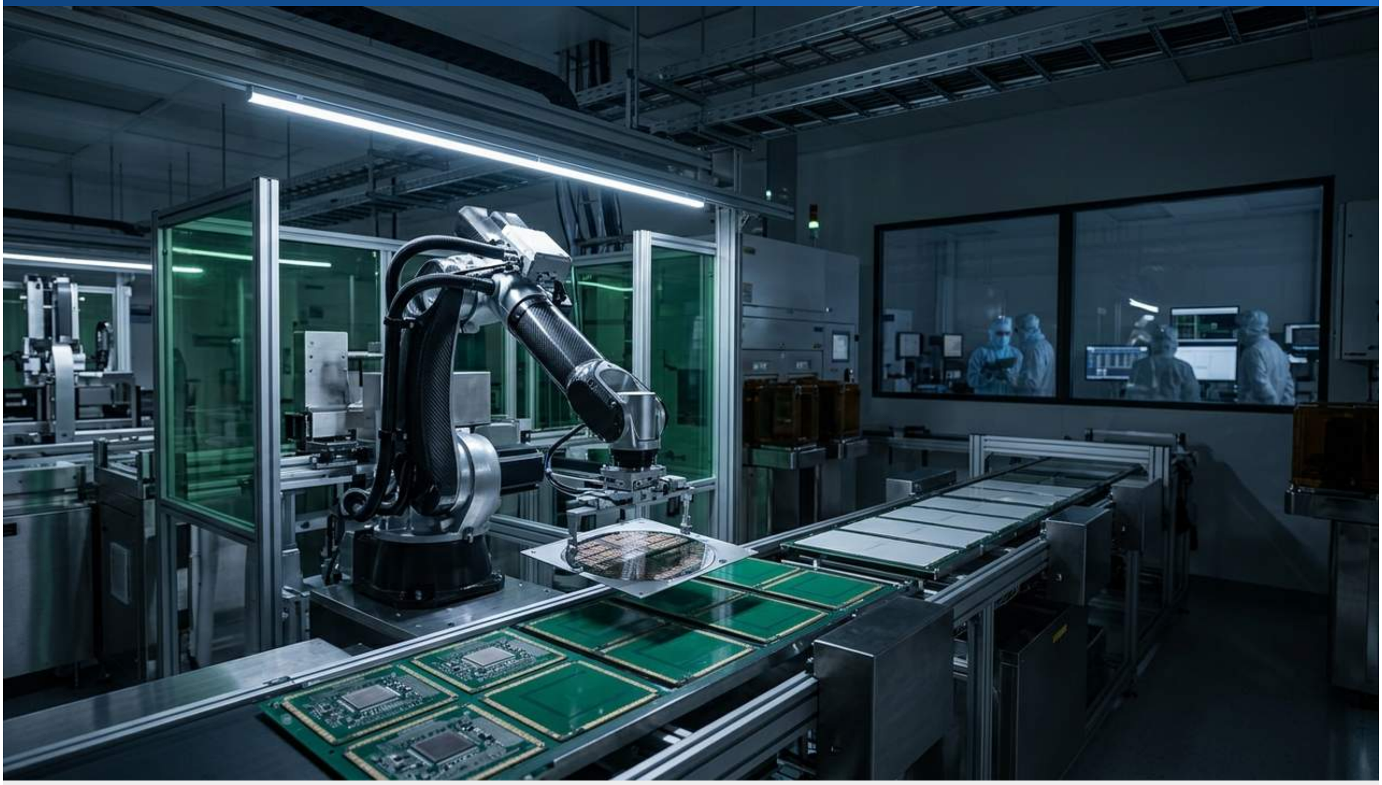
Strategic Significance & Outlook

Shinko Electric Industries' success with the 22-layer glass substrate marks a significant step towards the mass production of glass substrates. This development is expected to drive broader adoption of glass substrates in AI chips, further enhancing the performance and efficiency of AI computing. Future efforts will likely focus on reducing manufacturing costs, improving production throughput, and developing even higher-layer count and finer-pitch technologies. As reports suggest Samsung Electro-Mechanics faces ramp-up uncertainties, the manufacturing of glass substrates demands highly advanced technology and significant capital investment, implying that technologically leading companies will drive the market. Glass substrates hold the potential to establish a new standard for semiconductor packaging in future AI data centers, edge AI, and high-performance mobile devices.

Source: https://www.trendforce.com/news/2026/08/18/news-glass-substrate-war-heats-up-shinko-electric-advances-22-layer-product-as-samsung-reportedly-faces-ramp-up-uncertainty/

#20 TSMC CoWoS and ABF Substrate Supply Bottlenecks Threaten AI Chip Production Amid $265B Market Opportunity

Published August 17, 2026   Silicon To Software   USA



OVERVIEW

For leading AI accelerators, wafer manufacturing capacity is not the only constraint; CoWoS advanced packaging and ABF (Ajinomoto Build-up Film) substrate qualification cycles are also limiting production, sometimes more directly than front-end fab capacity. While ABF substrate shortages (supply 20% below demand) in 2021-2022 were expected to ease by 2023, surging AI demand has re-established them as a bottleneck. TSMC recognizes CoWoS supply's importance, believing accelerated AI-related capital expenditure will boost growth in manufacturing's electronics and precision engineering clusters. This bottleneck highlights supply chain challenges within a potential $265 billion AI chip market opportunity.

IN DEPTH

Key Findings

For today's leading AI accelerators, wafer manufacturing capacity is no longer the sole constraint; the certification cycles for CoWoS (Chip-on-Wafer-on-Substrate) advanced packaging and ABF (Ajinomoto Build-up Film) substrates also act as significant bottlenecks, sometimes imposing more direct limits on production volume than front-end fab capacity. Historically, ABF substrates faced shortages from 2021 to 2022, with supply falling approximately 20% short of demand. Although new capacity coming online in 2023 was expected to alleviate this, the current explosion in AI demand has re-established ABF substrates as an often-underestimated bottleneck, restricting the output of CPUs, GPUs, and network silicon even when die production is sufficient. TSMC acknowledges the critical importance of CoWoS supply, and accelerated AI-related capital expenditures are expected to drive growth in the manufacturing electronics and precision engineering clusters.

Technical Details

CoWoS is an advanced 2.5D packaging technology that integrates multiple chiplets (e.g., GPUs and HBMs) onto a silicon interposer, which is then packaged onto an ABF substrate. This architecture dramatically shortens inter-chip wiring distances, significantly boosting data transfer speeds and improving power efficiency. However, the CoWoS manufacturing process is highly complex, requiring advanced techniques and considerable time, particularly for wafer stacking, precise bonding, and final substrate connections. It also demands substantial investment in specialized equipment and cleanroom infrastructure; for example, expanding a CoWoS line by 10,000 wafers per month can require capital expenditures of $1.5 billion to $2 billion. ABF substrates serve as the foundational material for these CoWoS packages, making their supply crucial for high-performance packaging. A shortage of ABF substrates creates a bottleneck in the packaging stage, even with ample die production, ultimately limiting the final shipment volume of AI chips.

Background & Context

The explosive growth of the AI chip market has had widespread repercussions across the entire semiconductor supply chain. Foundry leaders like TSMC are aggressively expanding their advanced packaging capabilities, such as CoWoS, to meet the surging demand for AI accelerators, but the pace of expansion struggles to keep up with demand. This situation aligns with past observations that memory and ABF were among the two most critical shortages in semiconductors. AI-driven demand extends beyond CoWoS and HBM (High-Bandwidth Memory) to a broad range of back-end materials and equipment, including ABF substrates, necessitating integrated efforts and investments across the entire supply chain. This bottleneck is a critical industry challenge, considering the potential annual $265 billion growth opportunity in the AI chip market.

Strategic Significance & Outlook

The CoWoS and ABF substrate bottlenecks are likely to constrain AI chip supply and impact pricing in the short term. In response, industry leaders like TSMC are continuing to invest massive amounts in expanding advanced packaging capacity. In the medium to long term, the supply situation is expected to improve with the activation of new CoWoS fabs and increased production capacity from ABF substrate manufacturers. However, as AI technology evolves and applications expand, generating continuous new demand, the supply-demand balance is likely to remain tight. Furthermore, this situation will accelerate strategic initiatives to enhance supply chain resilience and reduce the risks associated with single-vendor dependence. The transition to new materials like glass substrates is also being explored as a potential direction to alleviate this bottleneck.

Source: https://www.silicontosoftware.com/tsmc-arizona-bottleneck/

#21 Morgan Stanley Upgrades Samsung Electro-Mechanics to Top Korean Tech Pick Amid Surging AI Demand

Published Published August 13, 2026 Evrim Ağacı トルコ

OVERVIEW

Morgan Stanley has elevated Samsung Electro-Mechanics to its premier Korean tech stock, citing the escalating technical demands of AI chip designs on advanced substrates. As AI processors become larger, multi-layered, and adopt multi-chiplet architectures, the company is strategically positioned to meet these challenges, having secured orders from U.S. ASIC firms and initiating a significant factory expansion in Vietnam by 2028. This move highlights Samsung Electro-Mechanics' emerging status as a pivotal supplier in the high-growth advanced semiconductor packaging sector.

IN DEPTH

Background

The insatiable demand for high-performance AI chips has become the primary growth engine for the global semiconductor industry. These sophisticated processors are indispensable across critical applications such as hyperscale data centers, autonomous driving platforms, and advanced edge AI deployments. This escalating demand inherently elevates the strategic importance of semiconductor back-end processes, particularly advanced packaging technologies. Within this dynamic landscape, Morgan Stanley's recent upgrade of Samsung Electro-Mechanics signals a clear recognition by the investment community of the company's strategically advantageous position to capitalize on this AI-driven growth wave. As a key player within the broader Samsung Group's semiconductor ecosystem, Samsung Electro-Mechanics holds a vital role in substrate technology and advanced packaging solutions, a presence expected to expand significantly in the burgeoning AI era supply chain.

Key Findings

Morgan Stanley has upgraded Samsung Electro-Mechanics (SEMCO) to its premier Korean tech stock, a move underpinned by the dramatic surge in AI-driven demand. This reflects a critical inflection point where AI chip designs are rapidly evolving towards greater complexity, larger form factors, increased layering, and sophisticated multi-chiplet architectures. Consequently, the technical requirements for the underlying packaging substrates are escalating dramatically. SEMCO is proactively addressing these market shifts; it has reportedly secured multiple orders from prominent U.S. ASIC companies and is vigorously advancing a significant expansion project for its new manufacturing facility in Vietnam, with an ambitious target completion date of 2028.

Technical Deep Dive

High-performance AI chips, encompassing both Graphics Processing Units (GPUs) and Application-Specific Integrated Circuits (ASICs), fundamentally rely on advanced substrates featuring ultra-high-density wiring and superior thermal management capabilities. These attributes are essential for processing the massive datasets at the high speeds demanded by modern AI workloads. The transition to multi-chiplet configurations, coupled with the tight integration of High-Bandwidth Memory (HBM) stacks, necessitates substrates capable of supporting an unprecedented number of layers—often dozens—and achieving significantly finer wiring pitches, approaching sub-micrometer scales. Advanced packaging substrates, including Ajinomoto Build-up Film (ABF) substrates and emerging glass substrates (both areas where Samsung Electro-Mechanics is active), are pivotal technologies addressing these stringent requirements. These substrates are critical for maintaining signal integrity between the bare die and the package, minimizing resistive power loss, and ensuring stable device operation at extremely high frequencies. The planned expansion of SEMCO's Vietnam factory is specifically designed to substantially augment the company's production capacity for these indispensable advanced substrates.

Strategic Significance & Outlook

The completion of Samsung Electro-Mechanics' Vietnam factory expansion by 2028 is poised to dramatically enhance the company's supply capacity for advanced packaging substrates, thereby solidifying its competitive standing within the fiercely contested AI chip market. This strategic boost in capacity will ensure a stable and reliable supply to a global clientele, including critical U.S. ASIC developers, fostering the broader adoption and continued advancement of AI technology worldwide. Looking forward, the relentless evolution of AI chip architectures will inevitably impose even greater demands on substrate technology, compelling SEMCO to address novel technical challenges through sustained investment in R&D and relentless innovation. This significant investment in manufacturing capability, combined with strategic customer acquisitions, establishes a robust foundation for Samsung Electro-Mechanics to assume a central and indispensable role in the construction of future AI infrastructure.

Source: https://evrimagaci.org/gpt/morgan-stanley-taps-samsung-electro-mechanics-as-top-pick-543996

#22 Sumitomo Bakelite and Mitsubishi Chemical Raise Packaging Material Prices for CoWoS and HBM Amid Surging Demand

Published August 13, 2026 Global Times China

OVERVIEW

Increasing demand for advanced processes and packaging, coupled with rising energy and raw material costs from Middle East conflicts and China's tightened export controls on strategic minerals, is disrupting high-purity material supply and driving up semiconductor material prices. Industry sources report Sumitomo Bakelite, a leader in the global epoxy molding compound market and a core supplier for CoWoS and HBM packaging, has increased prices. Since 2026, major manufacturers like Sumitomo Bakelite and Mitsubishi Chemical have raised packaging material prices due to high demand for AI chips, impacting the entire supply chain.

IN DEPTH

Key Findings

Semiconductor material prices are broadly increasing, driven by a complex interplay of factors: rising demand for advanced processes and packaging, escalating energy and raw material costs stemming from conflicts in the Middle East, and China's tightened export controls on strategic minerals, all disrupting the supply of high-purity materials. Notably, Sumitomo Bakelite, a core supplier for CoWoS (Chip-on-Wafer-on-Substrate) and HBM (High-Bandwidth Memory) packaging and a leader in the global epoxy molding compound market, has increased its prices. Since 2026, major manufacturers, including Sumitomo Bakelite and Mitsubishi Chemical, have raised prices for packaging materials in response to soaring demand for AI chips, creating widespread implications across the entire semiconductor supply chain.

Technical Details

Advanced packaging technologies like CoWoS and HBM are essential for integrating multiple chiplets at high density, enabling high-bandwidth and low-latency data transfer. These packaging solutions require high-performance packaging materials that can mitigate stress between materials with different coefficients of thermal expansion, ensuring excellent electrical and mechanical reliability. Epoxy molding compounds play a crucial role in protecting semiconductor chips from the external environment, aiding in heat dissipation, and providing electrical insulation. Specifically, CoWoS and HBM packaging demand materials with special properties due to the need for finer pitch wire bonding and high thermal cycling resistance. The increase in material prices directly impacts the manufacturing cost of the final AI chips and can be passed on to product prices.

Background & Context

The rapid expansion of AI computing infrastructure has led to an exponential increase in demand for high-performance semiconductor chips, creating bottlenecks in advanced packaging materials. Geopolitical tensions and rising resource nationalism further threaten the stability of specific raw material supplies, increasing price volatility risks. High-purity materials, indispensable for semiconductor manufacturing, are supplied by a limited number of companies that dominate the market, making them particularly sensitive to these factors. Japanese chemical manufacturers have established global leadership in these advanced material sectors, and their pricing decisions have significant repercussions on the global supply chain. This price increase will prompt semiconductor manufacturers to re-evaluate material sourcing strategies, diversify suppliers, or consider in-house material development.

Strategic Significance & Outlook

The rising cost of advanced semiconductor materials is a primary driver of increased overall AI chip manufacturing costs, which is likely to affect the prices of final products. While short-term price stabilization is anticipated to be challenging, in the medium to long term, the supply situation may improve as material manufacturers increase production capacity or as alternative materials are developed. However, as demand for high-performance AI chips is expected to continue growing, the stable supply of packaging materials will remain a critical challenge for the semiconductor industry. Enhanced transparency and robust risk management across the entire supply chain will become increasingly necessary moving forward.

Source: https://www.dintek-semi.com/prices-of-critical-semiconductor-materials-are-rising-across-the-board/

#23 HANMI Semiconductor Invests $91.4 Million in Largest-Ever 8th Production Facility in Incheon to Meet Soaring AI Chip Demand

Published August 18, 2026 Business Wire South Korea

OVERVIEW

HANMI Semiconductor is investing $91.4 million (approximately 130 billion KRW) to establish its largest-ever 8th production facility in Incheon, by acquiring Mercury Co., Ltd.'s factory, to proactively address the global shortage of AI semiconductor equipment. This new facility will produce next-generation semiconductor equipment, including TC bonders and hybrid bonders for HBM, 2.5D packaging equipment for AI semiconductors, and BOC COB bonders for high-performance memory production. Mass production is targeted for Q2 2027, marking a strategic investment to capitalize on the rapid growth of the AI semiconductor market.

IN DEPTH

Key Findings

HANMI Semiconductor has announced the establishment of its largest-ever 8th production facility, a substantial investment totaling $91.4 million (approximately 130 billion Korean Won), through the acquisition of Mercury Co., Ltd.'s factory in Incheon's Puan National Industrial Complex. This initiative is a proactive response to the persistent global shortage of AI semiconductor equipment. The new facility is slated to begin mass production in Q2 2027 and will focus on manufacturing next-generation advanced semiconductor equipment. This includes TC bonders for High-Bandwidth Memory (HBM), hybrid bonders, 2.5D packaging equipment for AI semiconductors, and BOC COB bonders for high-performance memory production.

Technical Details

TC (Thermo-Compression) bonders for HBM are crucial for precisely joining multiple DRAM dies vertically, leveraging heat and pressure. This technology is essential for achieving the high bandwidth and low latency characteristic of HBM and supports advanced connection techniques like micro-bumping and hybrid bonding. Hybrid bonders enable finer-pitch die-to-die connections, such as copper-to-copper direct bonding, enhancing electrical performance and thermal conductivity. Furthermore, 2.5D packaging equipment for AI semiconductors supports processes like CoWoS (Chip-on-Wafer-on-Substrate), which integrates GPUs or ASICs with HBM on a silicon interposer. BOC COB bonders contribute to the production of more robust and reliable high-performance memory packages, supporting the high-speed and stable data processing capabilities indispensable for AI workloads.

Background & Context

The demand for AI chips is surging across diverse sectors, including data centers, edge AI, and autonomous driving, dramatically elevating the importance of HBM and advanced packaging technologies. New technical challenges are emerging that traditional semiconductor manufacturing equipment cannot adequately address, increasing expectations for back-end equipment manufacturers like HANMI Semiconductor. HANMI Semiconductor's substantial investment strategically responds to these market trends, fundamentally strengthening its capacity to supply equipment critical for AI-era foundational technologies such as HBM and 2.5D/3D packaging. This aligns with South Korea's national strategy to maintain a leading role in the global semiconductor supply chain, particularly in memory and advanced packaging.

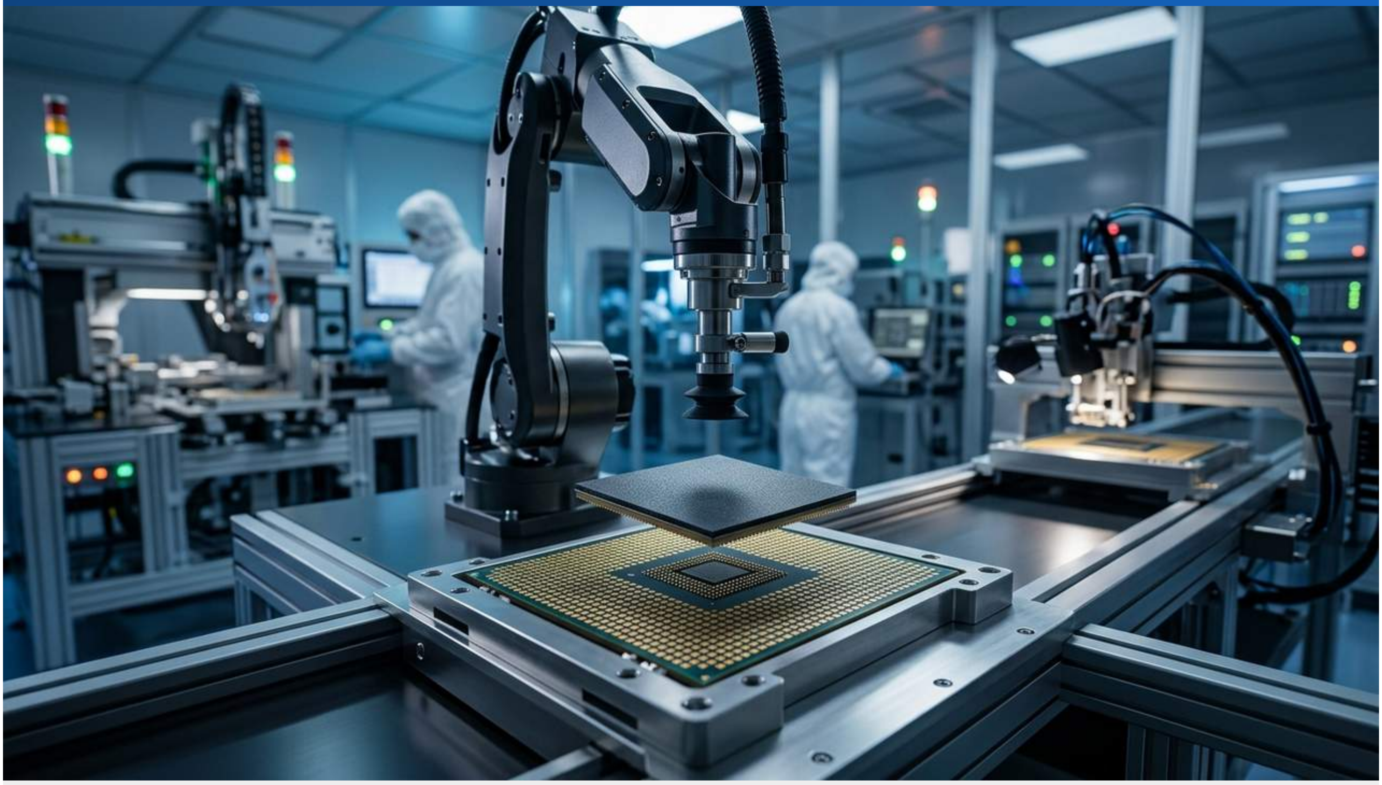
Strategic Significance & Outlook

Once the new Incheon production facility commences mass production in Q2 2027, HANMI Semiconductor will significantly expand its supply capacity in the HBM and advanced packaging equipment markets, thereby bolstering its global competitiveness. This investment is expected to help alleviate bottlenecks faced by AI semiconductor manufacturers, fostering further innovation and widespread adoption of AI technology. In the future, with the proliferation of hybrid bonding and other next-generation packaging technologies, HANMI Semiconductor's equipment will become key to realizing more highly integrated and high-performance AI systems. This will contribute to improved data center efficiency, the development of new AI applications, and the sustained growth of the entire semiconductor ecosystem.

Source: https://www.semiconductor-digest.com/hanmi-semiconductor-to-invest-in-its-largest-ever-8th-production-facility/

#24 Henkel Launches LOCTITE ABLESTIK CDF900 Conductive Die Attach Film with Over 8 W/m-K Thermal Conductivity for High-Power AI Packages

Published August 19, 2026 Henkel Germany



OVERVIEW

Henkel has introduced the LOCTITE ABLESTIK CDF900 series conductive die attach film to address thermal management challenges in high-power AI packages. This new product significantly boosts thermal conductivity to over 8 W/m-K through proprietary thermal filler technology, enabling efficient heat dissipation and stable performance for high-output components. Its film-based format eliminates risks like material bleed-out and uneven bond line thickness common with competing liquid die attach adhesives, enhancing reliability and production yield. This innovation directly responds to increasing heat fluxes in AI processors.

IN DEPTH

Key Findings

Henkel has unveiled its LOCTITE ABLESTIK CDF900 series conductive die attach film, specifically designed to address the pressing thermal management challenges in high-power AI packages. This innovative product leverages proprietary thermal filler technology to achieve a significant leap in thermal conductivity, surpassing 8 W/m-K (Watts per meter-Kelvin). This capability ensures efficient heat dissipation from high-output components, enabling stable and sustained performance of AI processors. Being a film-based format, it eliminates common issues associated with competing liquid die attach adhesives, such as material bleed-out and uneven bond line thickness, thereby significantly contributing to improved production yield and product reliability.

Technical Details

In high-power AI packages, the efficiency of heat transfer from the chip to the heatsink is paramount for overall performance and reliability. The LOCTITE ABLESTIK CDF900 series achieves its high thermal conductivity—exceeding 8 W/m-K—through a unique technology that uniformly disperses highly conductive fillers, a feat difficult to accomplish with conventional die attach materials. This thermal conductivity is especially critical for AI GPUs, where localized hotspots can reach 500–1,000 W/cm^2. The film format allows for precise control over layer thickness and minimizes the formation of voids during the bonding process, which in turn reduces the thermal resistance between the die and the substrate. This is expected to suppress temperature rise within the chip, preventing long-term performance degradation. Furthermore, the film is suitable for automated dispensing processes, contributing to enhanced production efficiency.

Background & Context

The rapid advancements in AI computing, GPUs, CPUs, and high-performance processors are imposing increasingly stringent thermal challenges on packaging. Current packaging technologies utilize polymer composites and metal/liquid metal alloys as Thermal Interface Materials (TIMs), but new mechanical failure modes like liquid metal pump-out and viscosity limitations from fillers in polymers have emerged. Henkel's new product directly addresses these challenges, offering a solution for managing the extreme heat fluxes generated by AI workloads. While filler-laden polymers were sufficient for packages dissipating around 100W, they are reaching their limits as advanced packages approach 1,000W. Against this backdrop, there is a strong industry-wide demand for higher-performance and more reliable TIMs.

Strategic Significance & Outlook

The introduction of the LOCTITE ABLESTIK CDF900 series marks a significant advancement in thermal management technology for AI chips. This product will contribute to reducing power consumption in AI data centers and facilitate the development of smaller, more powerful edge AI devices. In the future, as more highly integrated and efficient AI systems are required, the performance and reliability of thermally conductive materials will become even more critical. Continuous innovation from material manufacturers like Henkel will be foundational to the further scaling and widespread adoption of AI semiconductor technology. This film technology has the potential for broad adoption not only in AI but also in automotive, industrial electronics, high-performance computing, and any other sectors where thermal management is crucial.

Source: https://www.henkel.com/press-and-media/press-releases-and-kits/2026-08-19-henkel-launches-loctite-ablestik-cdf900-series-conductive-die-attach-film-2223146

#25 Lens Technology Enters Advanced Chip Packaging with Self-Developed Through-Glass Vias (TGV) Substrates and Dedicated 30,000sqm Factory

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OVERVIEW

Chinese smartphone glass screen manufacturer Lens Technology has announced its entry into the advanced chip packaging market, driven by AI chips pushing traditional material limits. The company showcased its self-developed Through-Glass Vias (TGV) substrates, specifically designed for advanced chip packaging. A dedicated 30,000-square-meter factory for TGV glass substrate production is currently under construction and slated to commence operations by year-end. This move signifies China's strategy to bolster domestic capabilities in the critical back-end of the semiconductor supply chain and introduces a new player to the global glass substrate competition.

IN DEPTH

Key Findings

Lens Technology, a leading Chinese manufacturer of glass screens for smartphones, has announced its significant entry into the advanced chip packaging market. This strategic move comes as the evolution of AI chips pushes the boundaries of traditional packaging materials. The company has publicly showcased its self-developed Through-Glass Vias (TGV) substrates, emphasizing their specific design for advanced chip packaging applications. Currently, a dedicated 30,000-square-meter factory for TGV glass substrate production is under construction, with operations expected to commence by the end of this year. This bold strategy symbolizes China's broader effort to enhance its domestic production capabilities in the critical back-end segment of the semiconductor supply chain.

Technical Details

Through-Glass Vias (TGV) technology involves creating microscopic vias (holes) that vertically penetrate a glass substrate, enabling high-density electrical interconnections between chips and the substrate, or between chiplets. Compared to conventional organic substrates, glass substrates offer advantages such as a lower coefficient of thermal expansion, which helps to suppress warpage. Their superior surface flatness is also extremely beneficial for forming fine wiring patterns and precisely placing multiple chiplets in 2.5D/3D packaging. Lens Technology's TGV substrates are believed to be designed to meet the high power density and bandwidth demands of AI chips, reducing signal attenuation and improving power efficiency. The 30,000-square-meter dedicated factory aims to establish mass production capabilities by equipping it with state-of-the-art facilities and a cleanroom environment suitable for the complex TGV manufacturing process.

Background & Context

The increasing performance of AI processors demands not only innovations in traditional semiconductor manufacturing but also significant advancements in packaging materials and processes. Especially for high-performance AI chips incorporating HBM (High-Bandwidth Memory), the thermal stability, dimensional stability, and electrical properties of the substrate are becoming bottlenecks. With major players like Intel, SKC, and Japan's Shinko Electric Industries focusing on glass substrate development, Lens Technology's entry signifies the addition of a prominent Chinese company to the global glass substrate race. The Chinese government prioritizes self-sufficiency and technological independence in the semiconductor supply chain, and advanced packaging is a critical pillar of this strategy. The company's existing expertise in glass processing technology may prove advantageous in the development of TGV substrates.

Strategic Significance & Outlook

The commencement of TGV glass substrate production by Lens Technology will mark a significant development in China's domestic AI chip supply chain. The factory's operation by year-end will represent a major step forward for China in enhancing its capabilities in advanced packaging. In the future, this technology holds the potential for widespread adoption in AI data centers, edge AI, and high-performance mobile devices. However, challenges remain for the mass production of glass substrates, including stabilizing yields, ensuring cost competitiveness, and adhering to international technical standards. It will be crucial to observe whether Lens Technology can overcome these challenges and establish itself as a key player in the global advanced packaging market.

Source: https://global.chinadaily.com.cn/a/202608/15/WS6a7fb06da31073853ec53711.html