

TROY TECHNICAL

ADHESIVES & SEALANTS

WEEKLY REPORT

October 3 - October 9, 2026 | Issue 2026-W40

**Bond-line performance, cure process,
durability and cross-industry qualification**

10

ANALYZED ARTICLES

10

PRIORITY THEMES

Issued 2026-10-09 | English edition | fixed approved cover artwork



Adhesives & Sealants: the boundary moved from isolated claims to qualification evidence

10 English articles were reviewed independently from the Japanese edition. Ten themes are retained for management decisions.

SIGNAL 01 | CHEMISTRY

Master Bond EP48TC: Thermal resistance specs for 2026 epoxy

Master Bond has launched EP48TC, a high-performance, two-component epoxy paste engineered to achieve an exceptionally low thermal resistance of $5\text{--}7 \times 10^{-6} \text{ K}\cdot\text{m}^2/\text{W}$, even when applied in bond lines as thin as 10-15 microns.

SIGNAL 02 | FORMULATION

β -Ga₂O₃ MOSFETs: 80x heat transfer area strategy explained

Researchers at Southwest Jiaotong University, led by Associate Professor Hongkun Li, have devised a hybrid thermal management strategy for β -Ga₂O₃ MOSFETs that combines a diamond thermal spreading layer (TSL) with silicon-substrate-embedded microchannels.

SIGNAL 03 | APPLICATION & CURE

Toshiba: 3300V SiC MOSFET specs and 40% thermal resistance cut

Toshiba Device & Storage Corporation has unveiled a new 3300V SiC MOSFET module incorporating silver sintering die-attach technology.

SIGNAL 04 | QUALIFIED PRODUCT

Perovskite: Solar cell stability and 27.39% efficiency results

Recent perovskite solar cell research demonstrates a significant advance, achieving a high power conversion efficiency of 27.39% through novel molecular design, alongside progress in resolving long-term stability issues.

DECISION

Focus this week's management attention on bond-line performance, cure process, durability and cross-industry qualification. Move only when the linked evidence can be reproduced under your own operating conditions.

THREE MANAGEMENT MOVES

1. Buyers: evaluate the complete joint or sealed system under process and lifetime conditions.
2. Suppliers: provide substrate preparation, cure window, rework, aging and failure-analysis evidence.
3. Executives: track adhesion aging, cure variability, outgassing, regulation, repair and scale.

EVIDENCE DISCIPLINE

FACT states what the collected English source reports. BUSINESS READ and ACTION are editorial interpretations. UNKNOWN lists information that the source file does not establish. A linked article is not treated as independent confirmation of every claim.

Five numbers or evidence anchors that require conditions

7 x A06	SOURCE-BOUND CONDITION Master Bond has launched EP48TC, a high-performance, two-component epoxy paste engineered to achieve an exceptionally low thermal resistance of 5-7 x 10⁻⁶ K•m²/W, even when applied in bond lines as thin as 10-15 microns.
80 times A10	SOURCE-BOUND CONDITION This innovative approach achieves superior heat dissipation by increasing the heat spreading angle from 32.2° to 88°, effectively enlarging the heat transfer area by approximately 80 times.
40% A03	SOURCE-BOUND CONDITION This module achieves up to a 40% reduction in thermal resistance compared to conventional solder bonding, drastically improving long-term reliability under severe thermal stress.
27.39% A05	SOURCE-BOUND CONDITION Recent perovskite solar cell research demonstrates a significant advance, achieving a high power conversion efficiency of 27.39% through novel molecular design, alongside progress in resolving long-term stability issues.
120 mm A09	SOURCE-BOUND CONDITION Intel's EMIB-T substrate technology has reported significant development results at ECTC 2026, featuring a 25 µm first-level interconnect bump pitch and 120 × 120 mm package dimensions.
HOW TO USE THESE NUMBERS Each value is shown with the condition stated in the collected English article. Do not compare values across different test methods, device sizes, operating temperatures or commercial stages without normalizing those conditions.	

Where the value chain moved

Each stage combines one leading theme and one supporting theme. The report treats handoffs as evidence transfers, not decorative arrows.

1

Chemistry

P01/P06

Master Bond has launched EP48TC, a high-performance, two-component epoxy paste engineered to achieve an exceptionally low.

2

Formulation

P02/P07

Researchers at Southwest Jiaotong University, led by Associate Professor Hongkun Li, have devised a hybrid thermal management.

3

Application & cure

P03/P08

Toshiba Device & Storage Corporation has unveiled a new 3300V SiC MOSFET module incorporating silver sintering die-attach.

4

Qualified product

P04/P09

Recent perovskite solar cell research demonstrates a significant advance, achieving a high power conversion efficiency of.

5

Repair & circularity

P05/P10

Intel's EMIB-T substrate technology has reported significant development results at ECTC 2026, featuring a 25 μm first-level.

EVIDENCE REQUIRED AT EACH HANDOFF

Chemistry to Formulation	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck adhesion aging, cure variability, outgassing, regulation, repair and scale.
Formulation to Application & cure	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck adhesion aging, cure variability, outgassing, regulation, repair and scale.
Application & cure to Qualified product	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck adhesion aging, cure variability, outgassing, regulation, repair and scale.
Qualified product to Repair & circularity	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck adhesion aging, cure variability, outgassing, regulation, repair and scale.

COMMON CONTROL POINT

No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented adhesion aging, cure variability, outgassing, regulation, repair and scale.

Priority map: maturity and next decision locus



REPRODUCIBLE POSITIONING RULE
Horizontal position uses five discrete stages: Research, Prototype, Joint evaluation, Product adoption and Scale. The vertical bands classify the next decision locus: Tech / process, System / adoption, or Business / rules (including supply systems). Article-title cues take precedence; the overview is used only when the title is silent. These are categories, not impact ranks. Bubble diameter reflects the editorial score.

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P01

Master Bond EP48TC: Thermal resistance specs for 2026 epoxy

A06 | Chemistry | Scale-up

Date not stated

FACT

Master Bond has launched EP48TC, a high-performance, two-component epoxy paste engineered to achieve an exceptionally low thermal resistance of 5-7 x 10⁻⁶ K•m²/W, even when applied in bond lines as thin as 10-15 microns. This breakthrough material provides superior thermal management capabilities crucial for high-power electronics and aerospace applications.

WHY IT MATTERS

The decision relevance is bond-line performance, cure process, durability and cross-industry qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide substrate preparation, cure window, rework, aging and failure-analysis evidence.

ACTION

Within 30 days, evaluate the complete joint or sealed system under process and lifetime conditions; record the evidence and owner against P01.

UNKNOWN

Still unproven or incompletely stated: adhesion aging, cure variability, outgassing, regulation, repair and scale.

EDITORIAL SCORE 21/25 | MATURITY 5/5 | DECISION LOCUS: SYSTEM / ADOPTION

P02

β-Ga2O3 MOSFETs: 80x heat transfer area strategy explained

A10 | Formulation | Pilot

Date not stated

FACT

Researchers at Southwest Jiaotong University, led by Associate Professor Hongkun Li, have devised a hybrid thermal management strategy for β-Ga2O3 MOSFETs that combines a diamond thermal spreading layer (TSL) with silicon-substrate-embedded microchannels. This innovative approach achieves superior heat dissipation by increasing the heat spreading angle from 32.2° to 88°, effectively enlarging the heat transfer area by approximately 80 times.

WHY IT MATTERS

The decision relevance is bond-line performance, cure process, durability and cross-industry qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide substrate preparation, cure window, rework, aging and failure-analysis evidence.

ACTION

Within 30 days, evaluate the complete joint or sealed system under process and lifetime conditions; record the evidence and owner against P02.

UNKNOWN

Still unproven or incompletely stated: adhesion aging, cure variability, outgassing, regulation, repair and scale.

EDITORIAL SCORE 20/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P03

Toshiba: 3300V SiC MOSFET specs and 40% thermal resistance cut

A03 | Application & cure | Joint evaluation

Date not stated

FACT

Toshiba Device & Storage Corporation has unveiled a new 3300V SiC MOSFET module incorporating silver sintering die-attach technology. This module achieves up to a 40% reduction in thermal resistance compared to conventional solder bonding, drastically improving long-term reliability under severe thermal stress. This innovation enables higher switching frequencies, reduced size of magnetic filters and heat sinks, and maximizes the performance of SiC power devices in industrial and renewable energy applications.

WHY IT MATTERS

The decision relevance is bond-line performance, cure process, durability and cross-industry qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide substrate preparation, cure window, rework, aging and failure-analysis evidence.

ACTION

Within 30 days, evaluate the complete joint or sealed system under process and lifetime conditions; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: adhesion aging, cure variability, outgassing, regulation, repair and scale.

EDITORIAL SCORE 20/25 | MATURITY 3/5 | DECISION LOCUS: TECH / PROCESS

P04

Perovskite: Solar cell stability and 27.39% efficiency results

A05 | Qualified product | Pilot

Date not stated

FACT

Recent perovskite solar cell research demonstrates a significant advance, achieving a high power conversion efficiency of 27.39% through novel molecular design, alongside progress in resolving long-term stability issues. Researchers identified degradation factors in the perovskite layer and introduced a new AI-driven approach to minimize material defects. This breakthrough accelerates the commercialization of next-generation solar cells and promises a substantial impact on the renewable energy market.

WHY IT MATTERS

The decision relevance is bond-line performance, cure process, durability and cross-industry qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide substrate preparation, cure window, rework, aging and failure-analysis evidence.

ACTION

Within 30 days, evaluate the complete joint or sealed system under process and lifetime conditions; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: adhesion aging, cure variability, outgassing, regulation, repair and scale.

EDITORIAL SCORE 20/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P05

Intel EMIB-T: Specs for 25µm bump pitch and 64Gb/s UCIe

A09 | Repair & circularity | Research

Date not stated

FACT

Intel's EMIB-T substrate technology has reported significant development results at ECTC 2026, featuring a 25 µm first-level interconnect bump pitch and 120 × 120 mm package dimensions. This advanced packaging solution, which utilizes localized silicon bridges with through-silicon vias (TSVs) embedded in the package substrate, now supports 12 Gb/s HBM4e and 64 Gb/s UCIe transmission.

WHY IT MATTERS

The decision relevance is bond-line performance, cure process, durability and cross-industry qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide substrate preparation, cure window, rework, aging and failure-analysis evidence.

ACTION

Within 30 days, evaluate the complete joint or sealed system under process and lifetime conditions; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: adhesion aging, cure variability, outgassing, regulation, repair and scale.

EDITORIAL SCORE 20/25 | MATURITY 1/5 | DECISION LOCUS: TECH / PROCESS

P06

Perovskite: Underwater solar cell specs and 34.71% efficiency

A04 | Chemistry | Research

Date not stated

FACT

A polymer-tuned wide-bandgap perovskite solar cell has achieved a record-breaking 34.71% power conversion efficiency in an underwater environment. This novel technology significantly surpasses previous underwater solar cell performance, demonstrating high efficiency at a simulated depth of 10m. This breakthrough is expected to make an indispensable contribution to the blue economy, serving as a sustainable power source for applications such as marine monitoring, underwater sensors, and aquaculture systems.

WHY IT MATTERS

The decision relevance is bond-line performance, cure process, durability and cross-industry qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide substrate preparation, cure window, rework, aging and failure-analysis evidence.

ACTION

Within 30 days, evaluate the complete joint or sealed system under process and lifetime conditions; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: adhesion aging, cure variability, outgassing, regulation, repair and scale.

EDITORIAL SCORE 20/25 | MATURITY 1/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P07

Tiangong University: Silicone TIM specs and 2.51 W/mK results

A01 | Formulation | Product adoption

Date not stated

FACT

Researchers from Tiangong University and the Shandong Product Quality Inspection Institute have developed a novel silicone-based thermal interface material (TIM) incorporating vertically oriented boron nitride platelets and graphene nanoplatelets. This composite achieves an impressive thermal conductivity of 2.51 W/mK at a remarkably low filler loading of only 8 wt%, while maintaining high electrical resistivity.

WHY IT MATTERS

The decision relevance is bond-line performance, cure process, durability and cross-industry qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide substrate preparation, cure window, rework, aging and failure-analysis evidence.

ACTION

Within 30 days, evaluate the complete joint or sealed system under process and lifetime conditions; record the evidence and owner against P07.

UNKNOWN

Still unproven or incompletely stated: adhesion aging, cure variability, outgassing, regulation, repair and scale.

EDITORIAL SCORE 19/25 | MATURITY 4/5 | DECISION LOCUS: TECH / PROCESS

P08

Resonac 300mm SiC: Cost and area vs 150mm wafers for AI/HPC

A07 | Application & cure | Pilot

Date not stated

FACT

Resonac Holdings has successfully developed Japan's first 300mm single-crystal silicon carbide (SiC) substrate, representing a major leap in semiconductor manufacturing. This 12-inch wafer provides approximately four times the surface area of current 150mm wafers, enabling substantial increases in device yield and significant reductions in fabrication costs per chip.

WHY IT MATTERS

The decision relevance is bond-line performance, cure process, durability and cross-industry qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide substrate preparation, cure window, rework, aging and failure-analysis evidence.

ACTION

Within 30 days, evaluate the complete joint or sealed system under process and lifetime conditions; record the evidence and owner against P08.

UNKNOWN

Still unproven or incompletely stated: adhesion aging, cure variability, outgassing, regulation, repair and scale.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P09

tesa: Debonding on Demand explained for 95% recycling efficiency

A02 | Qualified product | Product adoption

Date not stated

FACT

tesa has launched a groundbreaking 'Debonding on Demand' technology designed for the efficient disassembly, rework, repair, and recycling of electronic devices and batteries. This innovative adhesive system enables rapid, clean separation of bonded components using targeted external stimuli like electrical, laser, thermal, or stretching mechanisms, minimizing component damage.

WHY IT MATTERS

The decision relevance is bond-line performance, cure process, durability and cross-industry qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide substrate preparation, cure window, rework, aging and failure-analysis evidence.

ACTION

Within 30 days, evaluate the complete joint or sealed system under process and lifetime conditions; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: adhesion aging, cure variability, outgassing, regulation, repair and scale.

EDITORIAL SCORE 19/25 | MATURITY 4/5 | DECISION LOCUS: SYSTEM / ADOPTION

P10

Bergquist HI-FLOW THF 1600P: Henkel's 20-40% failure reduction

A08 | Repair & circularity | Scale-up

Date not stated

FACT

Henkel's Bergquist® HI-FLOW THF 1600P phase-change thermal interface material (TIM) has been successfully deployed in next-generation motor controllers, effectively managing high power densities and meeting efficiency requirements. The 1.5 W/m-K material demonstrates exceptional reliability, maintaining performance after 500 hours at 120°C with superior temperature cycling stability.

WHY IT MATTERS

The decision relevance is bond-line performance, cure process, durability and cross-industry qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide substrate preparation, cure window, rework, aging and failure-analysis evidence.

ACTION

Within 30 days, evaluate the complete joint or sealed system under process and lifetime conditions; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: adhesion aging, cure variability, outgassing, regulation, repair and scale.

EDITORIAL SCORE 19/25 | MATURITY 5/5 | DECISION LOCUS: SYSTEM / ADOPTION

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW 0-30 DAYS	NEXT 1-12 MONTHS	LATER 1-5 YEARS
Operating companies	evaluate the complete joint or sealed system under process and lifetime conditions	Run production-like qualification with explicit acceptance and stop criteria.	Build a portfolio and architecture that can absorb technology and supplier changes.
Materials, equipment and technology suppliers	provide substrate preparation, cure window, rework, aging and failure-analysis evidence	Create shared reliability, process-window and failure-analysis data with customers.	Standardize interfaces, traceability, lifecycle support and recovery services.
Trading, investment and legal teams	Map adhesion aging, cure variability, outgassing, regulation, repair and scale.	Contract for capacity, quality, change notice, liability, alternatives and exit.	Diversify regional, technical and customer concentration risk.

ROADMAP

NOW 0-30 DAYS Evidence ledger Owner: Strategy + quality Deliverable: claim, source, condition, owner	NOW 0-30 DAYS Risk screen Owner: Procurement + legal Deliverable: unknowns, alternatives, stop	NEXT 1-12 MONTHS Joint qualification Owner: R&D + supplier Deliverable: process window and failure data
NEXT 1-12 MONTHS Commercial gate Owner: Business + finance Deliverable: unit economics and capacity	LATER 1-5 YEARS Platform strategy Owner: Executive team Deliverable: portfolio and interface roadmap	LATER 1-5 YEARS Service layer Owner: Operations + channel Deliverable: monitoring, maintenance and recovery

GO / NO-GO GATES

GATE	OWNER	REQUIRED EVIDENCE	NO-GO CONDITION
G1 Evidence	Quality	Source, test conditions and reproducibility	No traceable evidence
G2 Integration	R&D	Interface, process window and failure analysis	Cannot meet system conditions
G3 Commercial	Business	Capacity, total cost, contract and alternatives	Economics or supply cannot be supported
G4 Lifecycle	Operations	Monitoring, maintenance, change notice and exit	No accountable operating plan

ANALYZED ARTICLES | ITEMS 01-10

Every title and URL is displayed in full. URLs wrap without shortening and remain clickable. A verified-reference label means the translated HTML did not retain its original source URL.

ID	FULL ARTICLE TITLE	FULL SOURCE / VERIFIED REFERENCE URL - CLICKABLE
A01	Tiangong University: Silicone TIM specs and 2.51 W/mK results	https://bioengineer.org/vertical-nanotube-networks-supercharge-heat-flow-in-electrically-insulating-polymer-films/
A02	tesa: Debonding on Demand explained for 95% recycling efficiency	https://www.tesa.com/en-us/industry/applications/debonding-on-demand
A03	Toshiba: 3300V SiC MOSFET specs and 40% thermal resistance cut	https://magazine-industry-usa.com/news/115775-toshiba-launches-3300v-sic-mosfet-module
A04	Perovskite: Underwater solar cell specs and 34.71% efficiency	https://now.solar/2026/10/01/polymer-tuned-perovskite-creates-high-efficiency-underwater-solar-cells-physics-world/
A05	Perovskite: Solar cell stability and 27.39% efficiency results	https://flash24.org/stories/perovskite-solar-research-the-newest-results-and-what/
A06	Master Bond EP48TC: Thermal resistance specs for 2026 epoxy	https://www.masterbond.com/tds/ep48tc
A07	Resonac 300mm SiC: Cost and area vs 150mm wafers for AI/HPC	https://www.semimedia.cc/resonac-develops-japans-first-300mm-sic-substrate-offering-about-4x-the-area-of-150mm-wafers/
A08	Bergquist HI-FLOW THF 1600P: Henkel's 20-40% failure reduction	https://next.henkel-adhesives.com/sk/en/case-studies/phase-change-material-reliably-manages-heat-in-motor-controllers.html
A09	Intel EMIB-T: Specs for 25µm bump pitch and 64Gb/s UCIe	https://www.bestpcbs.com/blog/2026/10/emib-t-substrate/
A10	β-Ga2O3 MOSFETs: 80x heat transfer area strategy explained	http://agoa.top/en/News/details.html?id=3632

Adhesives_Sealants — Selected Articles

Date: 2026-10-11

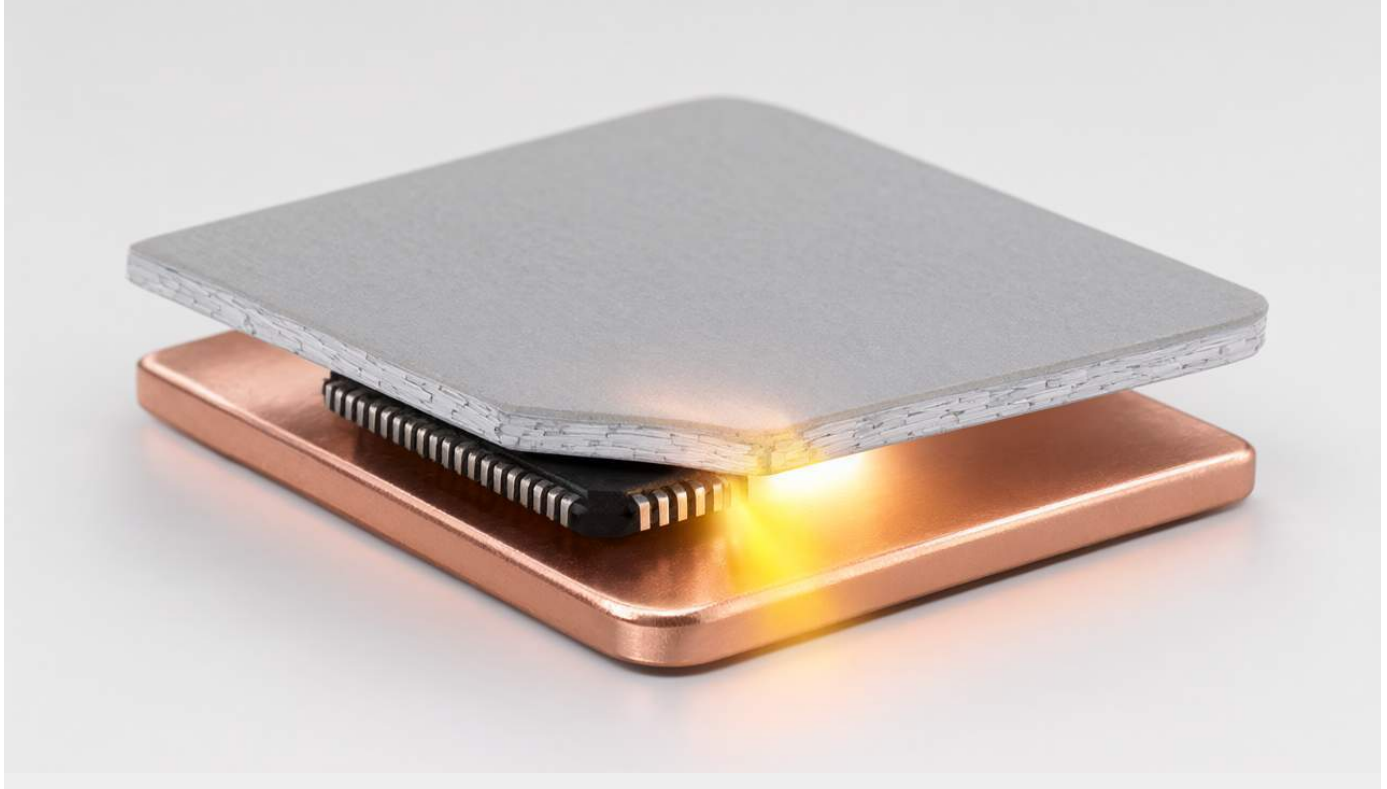
Articles: 10

Table of Contents

- #01 Tiangong University: Silicone TIM specs and 2.51 W/mK results
- #02 tesa: Debonding on Demand explained for 95% recycling efficiency
- #03 Toshiba: 3300V SiC MOSFET specs and 40% thermal resistance cut
- #04 Perovskite: Underwater solar cell specs and 34.71% efficiency
- #05 Perovskite: Solar cell stability and 27.39% efficiency results
- #06 Master Bond EP48TC: Thermal resistance specs for 2026 epoxy
- #07 Resonac 300mm SiC: Cost and area vs 150mm wafers for AI/HPC
- #08 Bergquist HI-FLOW THF 1600P: Henkel's 20-40% failure reduction
- #09 Intel EMIB-T: Specs for 25 μ m bump pitch and 64Gb/s UCIe
- #10 β -Ga₂O₃ MOSFETs: 80x heat transfer area strategy explained

#01 Tiangong University: Silicone TIM specs and 2.51 W/mK results

Published October 07, 2026 Tech Xplore China



OVERVIEW

Researchers from Tiangong University and the Shandong Product Quality Inspection Institute have developed a novel silicone-based thermal interface material (TIM) incorporating vertically oriented boron nitride platelets and graphene nanoplatelets. This composite achieves an impressive thermal conductivity of 2.51 W/mK at a remarkably low filler loading of only 8 wt%, while maintaining high electrical resistivity. This breakthrough offers a critical advancement for thermal management in high-performance electronics such as laptops, servers, base stations, and electric vehicle inverters, addressing the long-standing trade-off between thermal performance and electrical insulation.

Key Findings

A research team from Tiangong University, in collaboration with the Shandong Product Quality Inspection Institute in China, has engineered an innovative silicone-based thermal interface material (TIM) designed for high-performance electronics. This new composite features boron nitride platelets and graphene nanoplatelets assembled into vertically oriented networks, achieving an impressive thermal conductivity of 2.51 W/mK at an exceptionally low filler loading of just 8 weight percent, while simultaneously maintaining very high electrical resistance.

Technical Details

The high performance of this TIM stems from its unique design, where thermally conductive fillers—boron nitride platelets and graphene nanoplatelets—are precisely aligned within a silicone matrix to form vertical networks. Traditional TIMs often require high filler loadings to achieve adequate thermal conductivity, which can lead to reduced electrical resistance, increased viscosity, and compromised processability. This new approach overcomes these limitations by forming efficient heat conduction pathways even at low filler concentrations. The vertical orientation ensures direct and rapid heat transfer from the device to the heat sink, significantly enhancing overall thermal performance. Concurrently, the silicone-based matrix ensures excellent electrical insulation, crucial for the safety and reliability of electronic devices.

Background and Industry Context

As electronic devices become smaller, more powerful, and densely packed, thermal management has emerged as a paramount challenge. High heat generation in components like AI chips, high-performance processors, and electric vehicle power electronics directly impacts device performance, longevity, and reliability. Conventional TIMs struggle to balance high thermal conductivity with electrical insulation, and often suffer from processing difficulties due to high filler content. This research offers a cost-effective and high-performance solution to these persistent issues, representing a significant step forward in the thermal management landscape for advanced electronics.

Strategic Significance and Outlook

This novel vertical nanotube network TIM is expected to bring substantial improvements in thermal management across a wide range of high-performance electronic applications, including laptops, servers, base stations, and electric vehicle inverters. The achievement of high performance at low filler loadings could also lead to reduced material costs and simplified manufacturing processes, paving the way for broader commercial adoption. Its application in electric vehicle batteries and inverters, for instance, could mitigate the risk of thermal runaway, enhancing product safety and reliability. This development marks a significant advancement in meeting the ever-growing thermal demands of next-generation electronics.

Source: <https://bioengineer.org/vertical-nanotube-networks-supercharge-heat-flow-in-electrically-insulating-polymer-films/>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#02 tesa: Debonding on Demand explained for 95% recycling efficiency

Published October 01, 2026 tesa Germany



OVERVIEW

tesa has launched a groundbreaking 'Debonding on Demand' technology designed for the efficient disassembly, rework, repair, and recycling of electronic devices and batteries. This innovative adhesive system enables rapid, clean separation of bonded components using targeted external stimuli like electrical, laser, thermal, or stretching mechanisms, minimizing component damage. The technology promises to extend product lifespan, reduce repair costs, and significantly improve recycling rates by up to 95%, accelerating the transition to a circular economy.

Key Findings

tesa has introduced a transformative 'Debonding on Demand' technology poised to revolutionize the design, rework, repair, and recycling processes for products such as electronic devices, displays, and batteries. This innovative adhesive solution allows for the clean and efficient separation of bonded components in response to specific external stimuli, including electrical signals, laser irradiation, thermal input, or mechanical stretching. The technology extends product lifecycles, enhances repairability, and makes substantial contributions to waste reduction and boosting recycling rates by up to 95%.

Technical / Clinical Details

The 'Debonding on Demand' technology leverages specialized materials and structures integrated within the adhesive layer, which rapidly alter their bonding properties upon the application of external energy (electrical, thermal, optical, or mechanical force). For instance, electrical debonding uses a weak current to instigate a rapid change in the adhesive's molecular structure, causing an immediate loss of adhesion. Laser debonding targets specific wavelengths to decompose the adhesive, while thermal debonding causes the adhesive to soften or expand, facilitating easy detachment. Stretch debonding relies on applying force in a particular direction to thin the adhesive layer, reducing the bonding area and promoting separation. These mechanisms enable precise and swift separation without damaging the underlying substrates.

Background & Context

Modern electronic devices are characterized by increasing miniaturization and complexity, often featuring multiple materials intricately bonded together. This complexity makes disassembly and recycling particularly challenging. Traditional adhesives, while providing strong bonds, often necessitate destructive methods for separation, hindering the recovery of valuable components and materials. This issue directly contributes to the growing problem of electronic waste (E-waste) and resource depletion. tesa's 'Debonding on Demand' technology offers a potent solution, driving the shift towards a circular economy and simplifying compliance with environmental regulations for manufacturers.

Strategic Significance & Outlook

This technology holds immense potential for applications across various sectors, including enhancing smartphone repairability, improving EV battery recycling efficiency, facilitating rework of flexible displays, and enabling the sterilization and reuse of medical devices. Particularly for products containing high-value components, the ease of disassembly and separation will significantly promote component reuse and material recycling, maximizing both economic and environmental value. tesa plans to further develop this technology, offering customized solutions to meet diverse industrial needs, and thus contributing to a more sustainable future.

Source: <https://www.tesa.com/en-us/industry/applications/debonding-on-demand>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#03 Toshiba: 3300V SiC MOSFET specs and 40% thermal resistance cut

Published October 08, 2026 Magazine Industry USA Japan



OVERVIEW

Toshiba Device & Storage Corporation has unveiled a new 3300V SiC MOSFET module incorporating silver sintering die-attach technology. This module achieves up to a 40% reduction in thermal resistance compared to conventional solder bonding, drastically improving long-term reliability under severe thermal stress. This innovation enables higher switching frequencies, reduced size of magnetic filters and heat sinks, and maximizes the performance of SiC power devices in industrial and renewable energy applications.

Key Findings

Toshiba Device & Storage Corporation has launched a new 3300V SiC MOSFET module, significantly enhancing the performance and reliability of SiC power devices. The module integrates innovative silver sintering die-attach technology, successfully reducing thermal resistance by up to 40% compared to traditional solder bonding. This improvement dramatically boosts the long-term reliability under severe thermal stress, thereby increasing the overall robustness and lifespan of power electronic systems.

Technical / Clinical Details

Historically, SiC power modules have utilized solder bonding for connecting chips to substrates. However, under high power density and elevated operating temperatures, solder degradation presented a significant challenge. Toshiba's new module employs silver sintering technology, which uses high-melting-point, highly thermally conductive silver particles for bonding. This technique minimizes voids within the bonding layer, enabling highly efficient heat dissipation from the chip and substantially improving the overall thermal resistance of the module. Specifically, the internal thermal resistance is reduced by over 40% compared to conventional solder-bonded products, suppressing junction temperature rise and enhancing resistance to thermal fatigue, a common failure mode. This allows for higher switching frequencies in inverter and converter designs, contributing to the miniaturization of magnetic filters and heat sinks.

Background & Context

The demand for energy efficiency and higher performance is rapidly increasing in sectors such as electric vehicles (EVs), industrial equipment, and renewable energy systems. SiC (silicon carbide) power devices are considered next-generation power semiconductors due to their low loss and high-speed switching capabilities, making them ideal for these applications. However, the high performance of SiC devices also leads to significant heat generation, making efficient cooling and ensuring reliability critical technical challenges. Toshiba's silver sintering die-attach technology offers a decisive solution to this challenge, unlocking the full potential of SiC power devices.

Strategic Significance & Outlook

This 3300V SiC MOSFET module is expected to be adopted in a wide range of high-voltage, high-current applications, including railway systems, industrial motor drives, and power grid stabilization equipment. The reduction in thermal resistance and enhancement in reliability will directly contribute to system miniaturization, weight reduction, and extended lifespan, ultimately leading to improved overall energy efficiency. Toshiba plans to further develop this technology and expand its SiC power module lineup across various voltage and current ratings, aiming to contribute to the realization of a next-generation energy-saving society.

Source: <https://magazine-industry-usa.com/news/115775-toshiba-launches-3300v-sic-mosfet-module>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#04 Perovskite: Underwater solar cell specs and 34.71% efficiency

Published October 01, 2026 Physics World / NOW.solar International



OVERVIEW

A polymer-tuned wide-bandgap perovskite solar cell has achieved a record-breaking 34.71% power conversion efficiency in an underwater environment. This novel technology significantly surpasses previous underwater solar cell performance, demonstrating high efficiency at a simulated depth of 10m. This breakthrough is expected to make an indispensable contribution to the blue economy, serving as a sustainable power source for applications such as marine monitoring, underwater sensors, and aquaculture systems.

Key Findings

A polymer-tuned wide-bandgap perovskite solar cell has achieved an unprecedented 34.71% power conversion efficiency in an underwater environment, significantly surpassing all previous records. This groundbreaking achievement was particularly demonstrated under simulated conditions corresponding to a depth of 10 meters, opening new possibilities for solar cell applications in aquatic settings. This technology is expected to serve as a sustainable power source for 'blue economy' related applications such as marine monitoring, underwater sensor networks, and aquaculture.

Technical / Clinical Details

This innovative perovskite solar cell maximizes light absorption and charge carrier extraction efficiency in underwater environments by precisely tuning the bandgap of the perovskite material and passivating its surface with a specific polymer layer. The polymer layer acts as a protective barrier, shielding the perovskite from moisture degradation and ensuring long-term stability. The research team successfully suppressed charge carrier trapping by water and prevented a decrease in photoelectric conversion efficiency through optimizing this polymer-perovskite interface. Experiments confirmed that high efficiency could be maintained even under the attenuated solar spectrum at 10 meters depth, overcoming the challenge where conventional terrestrial solar cells rapidly degrade in underwater conditions.

Background & Context

The ocean, covering over 70% of the Earth's surface, offers vast untapped energy potential, yet efficient and durable power sources capable of operating underwater have been limited. Conventional underwater solar cells have faced challenges such as light attenuation due to water absorption, hydrostatic pressure, and corrosion, resulting in relatively low conversion efficiencies. Perovskite solar cells, known for their high efficiency and low manufacturing costs, are considered next-generation solar cells but have been plagued by significant vulnerability to moisture. This research dramatically improves the underwater stability and efficiency of perovskite materials, making their utilization in marine environments a reality and providing an indispensable technological foundation for the blue economy's advancement.

Strategic Significance & Outlook

Polymer-tuned perovskite underwater solar cells have the potential to revolutionize power supply for autonomous underwater vehicles (AUVs), data buoys, environmental sensors, and underwater communication devices in the marine sector. They can also contribute to sustainable food production by meeting the power needs of coastal aquaculture facilities. Future efforts will focus on evaluating performance at greater depths, verifying long-term stability, and developing cost-effective manufacturing methods for large-scale production. If commercialized, this technology is expected to create new industries that balance effective utilization of marine resources with environmental protection.

Source: <https://now.solar/2026/10/01/polymer-tuned-perovskite-creates-high-efficiency-underwater-solar-cells-physics-world/>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#05 Perovskite: Solar cell stability and 27.39% efficiency results

Published October 02, 2026 FLASH24 International



OVERVIEW

Recent perovskite solar cell research demonstrates a significant advance, achieving a high power conversion efficiency of 27.39% through novel molecular design, alongside progress in resolving long-term stability issues. Researchers identified degradation factors in the perovskite layer and introduced a new AI-driven approach to minimize material defects. This breakthrough accelerates the commercialization of next-generation solar cells and promises a substantial impact on the renewable energy market.

Key Findings

Recent perovskite solar cell research has achieved an impressive power conversion efficiency of 27.39% in single-junction cells, driven by novel molecular designs and AI-assisted material optimization. This accomplishment stems from a deeper understanding of inherent stability challenges in perovskite materials, particularly degradation mechanisms due to moisture and oxygen, and the introduction of new approaches to counteract them. This advancement holds the potential to accelerate the commercialization of next-generation solar cells and bring significant transformation to the renewable energy market.

Technical / Clinical Details

Researchers combined two primary approaches to enhance both efficiency and stability of perovskite solar cells. First, an innovative molecular design was employed to suppress ion migration within the perovskite crystal structure and slow down degradation in humid environments. Specifically, precise tuning of organic cation and halide anion compositions led to the formation of more stable crystal phases, improving resistance to humidity and heat. Second, an AI and machine learning-driven materials science approach was utilized. AI rapidly identified optimal combinations from thousands of material compositions and process conditions, providing guidelines to minimize defect density within the perovskite layer. This successfully reduced device efficiency loss and extended operational lifetime. Experimental results confirmed that cells achieving 27.39% efficiency demonstrated significantly superior stability in accelerated degradation tests compliant with IEC (International Electrotechnical Commission) standards, compared to conventional products.

Background & Context

Perovskite solar cells are garnering significant expectations as next-generation photovoltaics due to their high conversion efficiency, comparable to silicon solar cells, and relatively low manufacturing costs. However, instability against moisture, oxygen, heat, and UV light has been the biggest barrier to their commercialization. While previous research primarily focused on efficiency improvements, commercialization remains difficult without resolving stability issues. This research addresses both efficiency and stability, and the approach of integrating advanced technologies like AI into material design represents a new paradigm for future scientific research.

Strategic Significance & Outlook

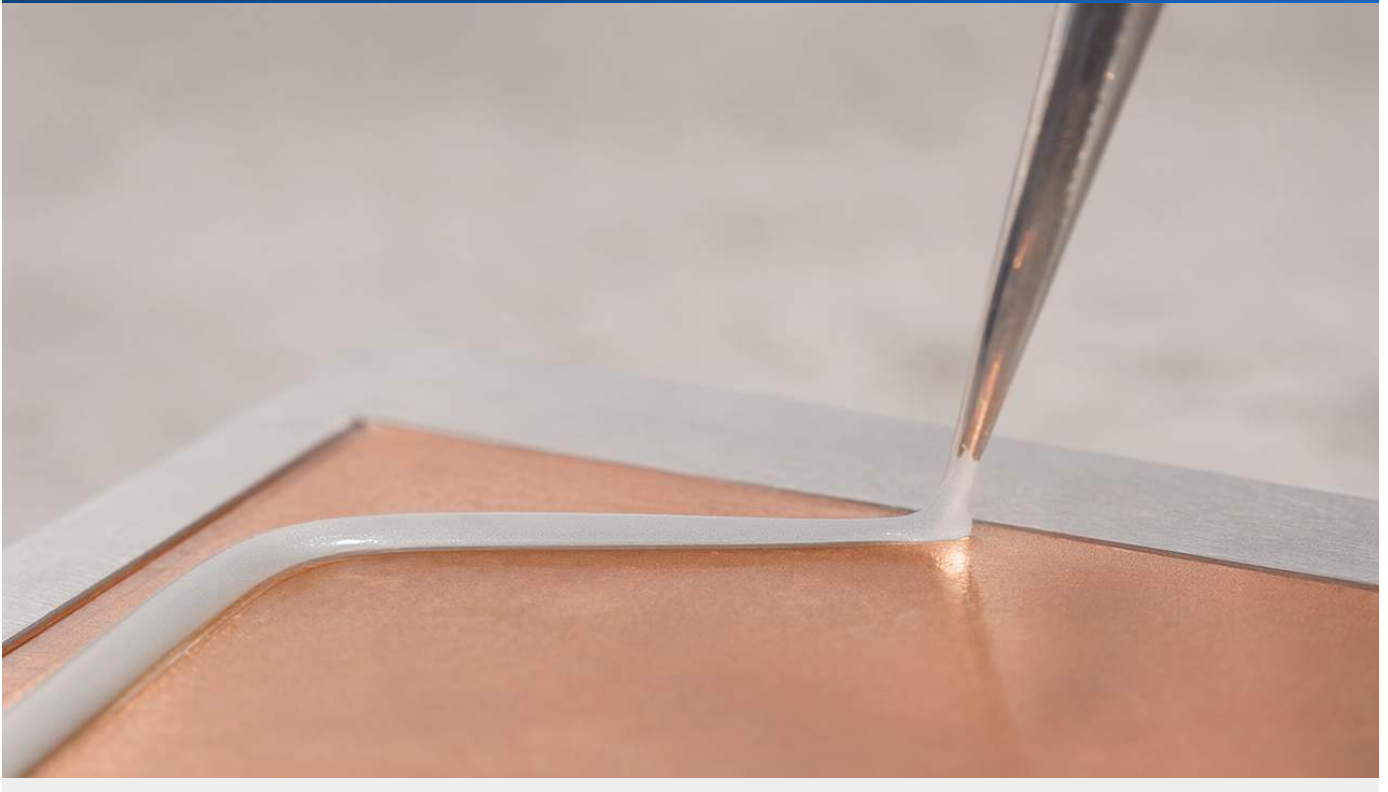
The progress in achieving high efficiency (27.39%) and improved stability makes perovskite solar cells a realistic possibility for broader applications, including residential, industrial, and even space uses. If commercialized, this technology would further reduce the installation and generation costs of solar power systems, becoming a powerful driving force for accelerating renewable energy adoption. Future efforts will focus on establishing mass production technologies, further long-term stability evaluation, and performance validation under various environmental conditions. AI-driven material development, applicable not only to perovskites but also to other novel materials, is expected to further accelerate the evolution of science and technology.

Source: <https://flash24.org/stories/perovskite-solar-research-the-newest-results-and-what/>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#06 Master Bond EP48TC: Thermal resistance specs for 2026 epoxy

Published October 01, 2026 Master Bond Inc. USA



OVERVIEW

Master Bond has launched EP48TC, a high-performance, two-component epoxy paste engineered to achieve an exceptionally low thermal resistance of $5-7 \times 10^{-6}$ K•m²/W, even when applied in bond lines as thin as 10-15 microns. This breakthrough material provides superior thermal management capabilities crucial for high-power electronics and aerospace applications. It combines high bond strength, electrical insulation, and excellent resistance to thermal shock and fatigue, also being NASA low outgassing approved, setting a new benchmark for thermal interface materials.

Key Findings

Master Bond has introduced EP48TC, a groundbreaking two-component epoxy paste featuring highly thermally conductive fillers. This material is distinguished by its ability to achieve an exceptionally low thermal resistance of $5-7 \times 10^{-6} \text{ K}\cdot\text{m}^2/\text{W}$, even when applied in ultrathin bond lines measuring just 10-15 microns. This represents a significant advancement in thermal management for demanding electronic and aerospace applications, where compact designs and high power densities are commonplace.

Technical / Clinical Details

EP48TC's performance is not limited to its thermal properties. It offers a robust suite of mechanical and electrical characteristics, including high bond strength, reliable electrical insulation, and outstanding resistance to thermal shock, impact, and stress cracking fatigue. Its formulation ensures durability and stability under extreme operational conditions. A critical feature for sensitive applications is its NASA low outgassing approval, affirming its suitability for vacuum environments. The paste consistency facilitates precise application in complex geometries and confined spaces, enhancing manufacturing flexibility for high-performance components.

Background & Context

The increasing power density in modern electronics, from advanced semiconductors to electric vehicle battery packs, necessitates increasingly efficient thermal management solutions. Traditional thermal interface materials have often presented limitations in thickness and thermal resistance, impeding further miniaturization and integration. EP48TC directly addresses these challenges by enabling ultrathin, high-performance thermal interfaces. This innovation is pivotal for preventing thermal runaway, extending component lifespan, and optimizing overall system performance in critical applications.

Strategic Significance & Outlook

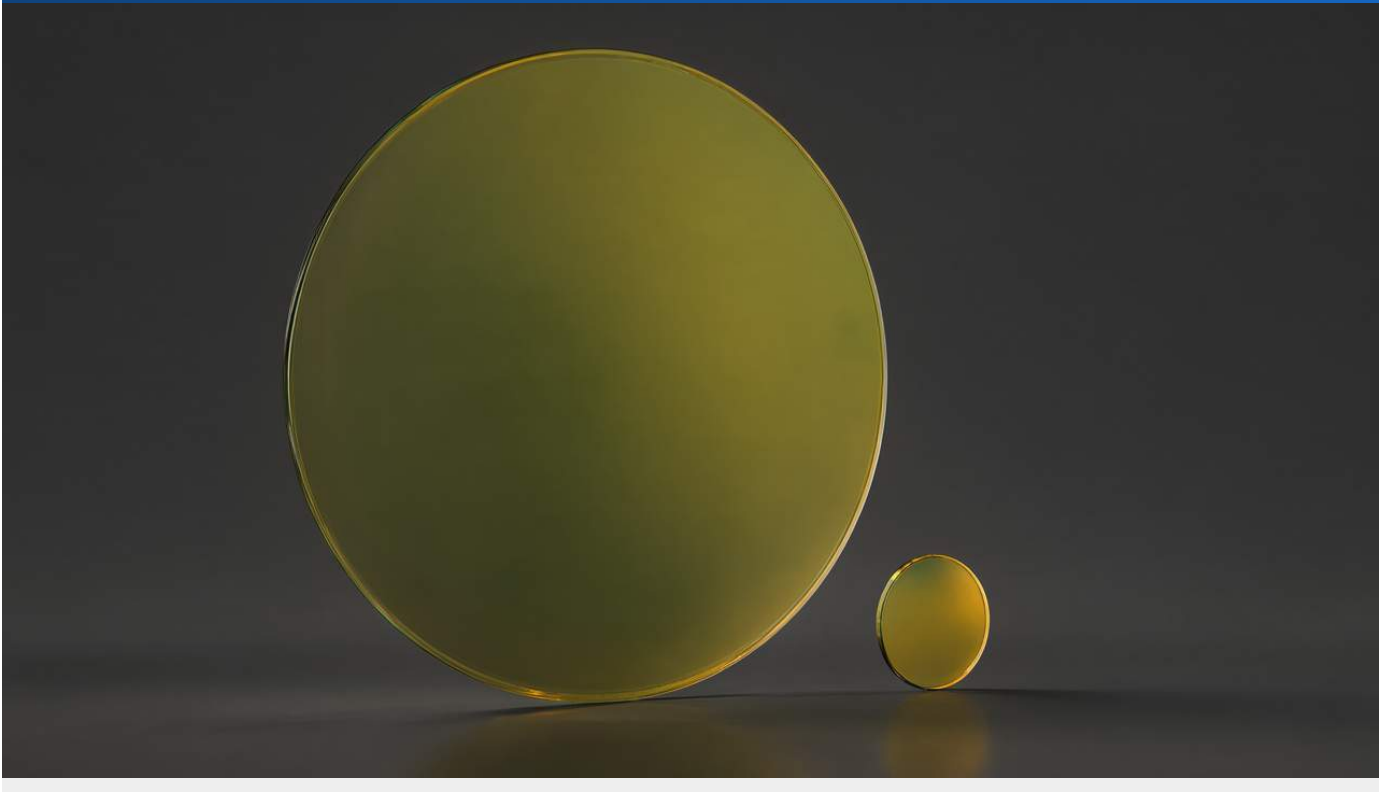
The introduction of Master Bond's EP48TC is poised to make a substantial impact across industries requiring superior thermal performance and reliability, including aerospace, defense, medical devices, automotive electronics, and high-brightness LED applications. By pushing the boundaries of thermal interface capabilities, this technology will enable engineers to design more powerful and compact electronic systems, unlock new possibilities for device architecture, and contribute to the development of next-generation technologies. Future advancements may focus on further reducing application thickness while maintaining performance, or developing more efficient dispensing methods to broaden its adoption.

Source: <https://www.masterbond.com/tds/ep48tc>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#07 Resonac 300mm SiC: Cost and area vs 150mm wafers for AI/HPC

Published October 01, 2026 SemiMedia Japan



OVERVIEW

Resonac Holdings has successfully developed Japan's first 300mm single-crystal silicon carbide (SiC) substrate, representing a major leap in semiconductor manufacturing. This 12-inch wafer provides approximately four times the surface area of current 150mm wafers, enabling substantial increases in device yield and significant reductions in fabrication costs per chip. The breakthrough addresses complex challenges in SiC crystal growth at over 2,000°C, managing defects, stress, and warpage in larger diameters, paving the way for next-generation power and thermal dissipation solutions in AI servers and advanced packaging.

Key Findings

Resonac Holdings has announced a significant technological breakthrough, successfully developing Japan's first 300-millimeter (12-inch) single-crystal silicon carbide (SiC) substrate. This larger wafer offers approximately four times the surface area of the currently prevalent 150mm SiC wafers, directly translating to a potential four-fold increase in devices produced per substrate and substantial improvements in manufacturing economics. This innovation positions SiC wafers as a more viable and cost-effective solution for high-growth areas like advanced thermal dissipation in AI servers and high-performance computing (HPC), as well as advanced packaging substrates.

Technical / Clinical Details

The development of 300mm SiC substrates is a monumental technical achievement, overcoming inherent challenges in SiC crystal growth. SiC crystal growth typically occurs at temperatures exceeding 2,000°C, a process notoriously difficult to control, particularly for larger diameters. Key hurdles included managing crystallographic defects, internal stresses, and preventing warpage in the larger wafers. Resonac's success demonstrates mastery over these complex material science and engineering aspects. The increased wafer size is critical for cost reduction in semiconductor manufacturing; a larger substrate means more chips can be fabricated from a single wafer, amortizing fixed process costs over a greater number of units. This enhanced productivity is vital for the widespread adoption of SiC in power electronics and advanced computing, where superior thermal conductivity and mechanical rigidity of SiC offer significant performance advantages over silicon, particularly for handling high power densities and operating temperatures.

Background & Context

The semiconductor industry is undergoing a paradigm shift, driven by the explosive growth of artificial intelligence, 5G, and electric vehicles. These applications demand power devices and high-frequency components that can operate more efficiently and reliably under extreme conditions than traditional silicon-based devices. SiC, a wide bandgap semiconductor, is ideally suited for these requirements due to its superior electrical and thermal properties. However, the cost and availability of large-diameter SiC wafers have been significant barriers to its broader adoption. The industry has primarily relied on 150mm wafers, with 200mm being the current frontier for many. Resonac's leap to 300mm represents a pivotal moment, accelerating the transition to larger SiC substrates and potentially democratizing access to high-performance SiC devices. This development is crucial for Japan's semiconductor materials sector, reinforcing its global leadership in advanced materials essential for next-generation electronics.

Strategic Significance & Outlook

The introduction of 300mm SiC wafers by Resonac carries immense strategic significance. It promises to dramatically lower the cost per SiC die, making SiC power devices more competitive with silicon-based alternatives and accelerating their penetration into mainstream markets. This will have a ripple effect across the entire electronics ecosystem, enabling more efficient power conversion in EVs, more compact and powerful AI accelerators, and greener data centers by reducing energy losses. Resonac's achievement will likely spur further investments and competition in large-diameter SiC manufacturing globally, pushing the boundaries of what's possible in power electronics and advanced packaging. The company is now poised to play an even more critical role in the global supply chain for high-performance semiconductor materials, driving the realization of energy-efficient and high-performance electronic systems.

Source: <https://www.semimedi.cc/resonac-develops-japans-first-300mm-sic-substrate-offering-about-4x-the-area-of-150mm-wafers/>

#08 Bergquist HI-FLOW THF 1600P: Henkel's 20-40% failure reduction

Published October 08, 2026 Henkel Adhesive Germany



OVERVIEW

Henkel's Bergquist® HI-FLOW THF 1600P phase-change thermal interface material (TIM) has been successfully deployed in next-generation motor controllers, effectively managing high power densities and meeting efficiency requirements. The 1.5 W/m-K material demonstrates exceptional reliability, maintaining performance after 500 hours at 120°C with superior temperature cycling stability. This TIM, solid at room temperature and flowing at its transition temperature, has extended product lifetime, boosted customer field reliability, and reduced field returns by 20% to 40%.

Key Findings

Henkel's Bergquist® HI-FLOW THF 1600P, a high-performance phase-change thermal interface material (TIM), has been successfully integrated into next-generation motor controllers, effectively addressing demanding power density and efficiency requirements. This implementation has demonstrably improved customer field reliability, leading to a significant reduction in field returns by 20% to 40%.

Technical / Clinical Details

The Bergquist® HI-FLOW THF 1600P features a thermal conductivity of 1.5 W/m-K. It is solid at room temperature but transitions to a liquid-like state upon reaching its phase-change temperature, allowing it to conform perfectly to microscopic surface irregularities between components (e.g., IGBTs, MOSFETs) and heatsinks. This ensures minimal thermal resistance and highly efficient heat transfer. Rigorous testing has validated its robust performance, including excellent temperature cycling stability and no degradation after 500 hours at 120°C. This exceptional durability is critical for motor controllers, which often operate in environments with continuous thermal fluctuations. By maintaining optimal operating temperatures, the TIM extends the lifespan of internal components, thereby enhancing the overall reliability of the motor controller system.

Background & Context

The electric vehicle (EV) and industrial motor sectors are increasingly pushing for more efficient and compact motor controllers. This trend invariably leads to higher power densities within the controllers, making thermal management a paramount concern. Excessive heat can severely degrade semiconductor performance and lead to premature failures, underscoring the indispensable role of reliable thermal interface materials. The successful deployment of Henkel's Bergquist® HI-FLOW THF 1600P highlights the material's ability to meet these escalating demands, providing a robust solution for critical thermal challenges in high-power applications.

Strategic Significance & Outlook

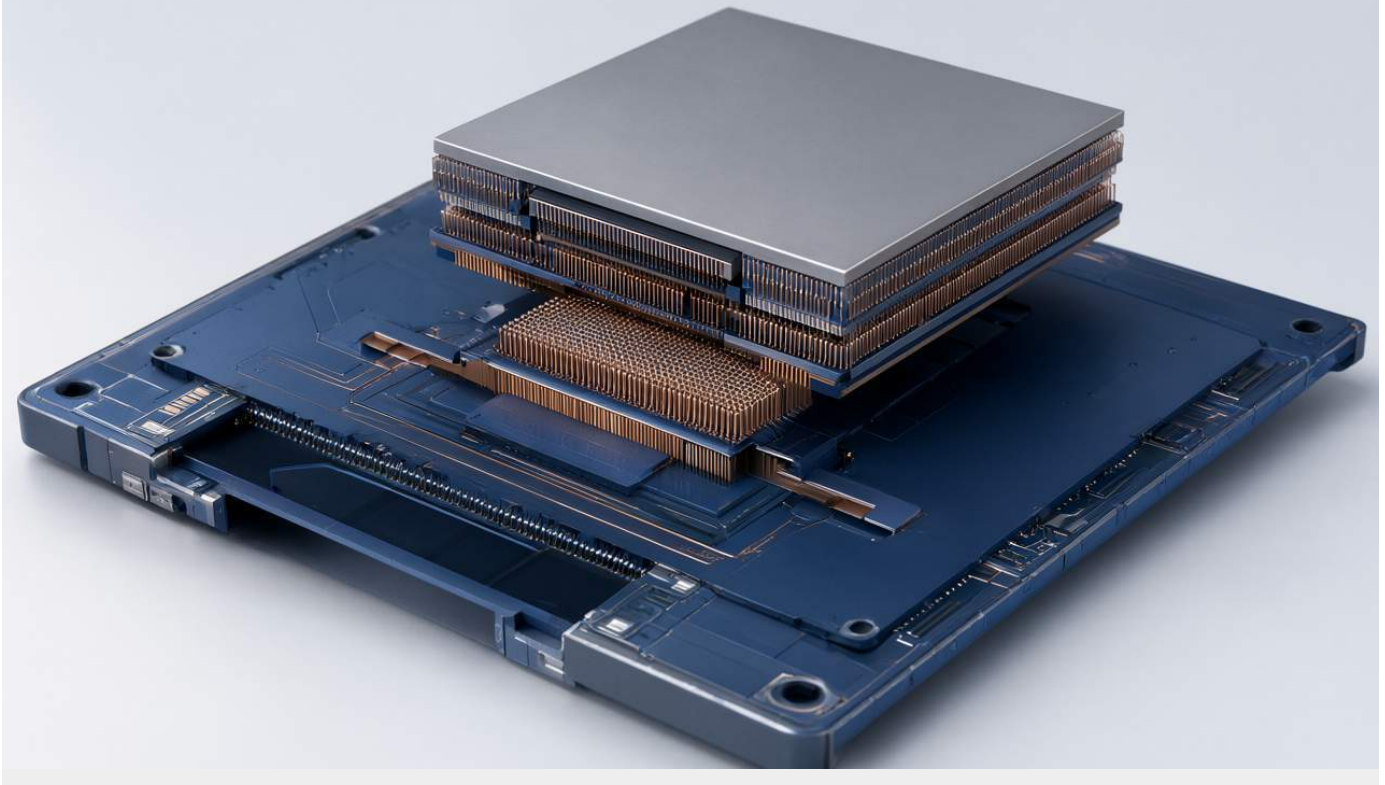
The demonstrated 20-40% reduction in field failures for motor controllers adopting Henkel's Bergquist® HI-FLOW THF 1600P establishes a strong competitive advantage for this TIM in the market. This success is expected to drive broader adoption of similar phase-change TIM solutions across other sectors requiring high reliability and efficiency, such as renewable energy systems, industrial robotics, and data center power supplies. Henkel is well-positioned to leverage this proven technology to further develop and introduce advanced thermal management solutions that are not only high-performing but also environmentally conscious, continuously meeting the evolving and increasing demands of the global electronics industry.

Source: <https://next.henkel-adhesives.com/sk/en/case-studies/phase-change-material-reliably-manages-heat-in-motor-controllers.html>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#09 Intel EMIB-T: Specs for 25 μ m bump pitch and 64Gb/s UCIe

Published October 01, 2026 EBest Circuit China



OVERVIEW

Intel's EMIB-T substrate technology has reported significant development results at ECTC 2026, featuring a 25 μ m first-level interconnect bump pitch and 120 × 120 mm package dimensions. This advanced packaging solution, which utilizes localized silicon bridges with through-silicon vias (TSVs) embedded in the package substrate, now supports 12 Gb/s HBM4e and 64 Gb/s UCIe transmission. The manufacturing process involves critical steps like cavity preparation, bridge placement and bonding, dielectric and copper layer build-up, and underfill or bonding operations, signifying a major leap for high-performance chiplet integration.

Key Findings

Intel's EMIB-T substrate technology has demonstrated significant advancements, as reported at the ECTC 2026 technology update. This innovative packaging solution has achieved an ultra-fine 25 μm first-level interconnect bump pitch and supports large package dimensions up to 120 $\times$ 120 mm. Crucially, it now offers robust support for next-generation memory and interconnect standards, including 12 Gb/s HBM4e and 64 Gb/s UCIe transmission, marking a pivotal step for high-performance chiplet integration.

Technical / Clinical Details

Intel's EMIB-T (Embedded Multi-die Interconnect Bridge - Thin) substrate technology employs a sophisticated approach where localized silicon bridges, equipped with through-silicon vias (TSVs), are directly embedded within the package substrate. This architecture enables high-density chip-to-chip interconnections. Specific technical breakthroughs reported at ECTC 2026 include:

- **First-Level Interconnect Bump Pitch:** Achieved a fine pitch of 25 μm . This is fundamental for maximizing data transfer bandwidth between chiplets and enabling extremely high-density connectivity.
- **Package Dimensions:** Capable of supporting up to 120 $\times$ 120 mm packages. This offers enhanced flexibility for integrating multiple large chiplets into a single, cohesive package.
- **HBM4e Support:** Enables 12 Gb/s High Bandwidth Memory (HBM4e) transmission. This addresses the escalating memory bandwidth requirements of high-performance AI accelerators and High-Performance Computing (HPC) systems.
- **UCIe Support:** Provides support for 64 Gb/s Universal Chiplet Interconnect Express (UCIe) transmission. This facilitates high-speed, standardized interconnections between chiplets from various vendors, fostering an open chiplet ecosystem.

The manufacturing process for EMIB-T involves several complex and critical steps: precise preparation of substrate cavities, accurate placement and bonding of the silicon bridges, meticulous build-up of dielectric and copper layers, and final underfill or bonding operations.

Background & Context

With the relentless advancement of AI and HPC, semiconductor performance scaling is shifting from monolithic die designs to integrating multiple smaller chiplets. In this heterogeneous integration paradigm, packaging technologies that provide fast and efficient inter-chiplet communication are paramount for both performance and cost-effectiveness. Intel's EMIB technology has been recognized as a cost-effective alternative to traditional interposer-based 2.5D packaging, striking a balance between performance and integration density. EMIB-T further evolves this technology by accommodating next-generation interfaces like HBM and UCIe, aiming to establish new standards for AI-era semiconductor packaging.

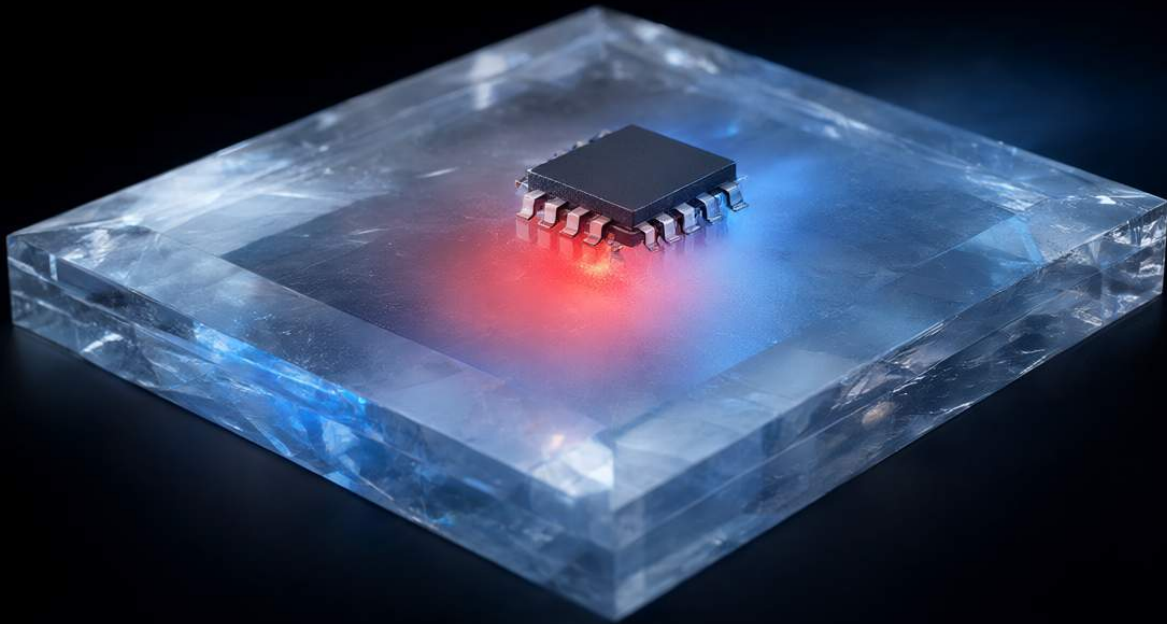
Strategic Significance & Outlook

These advancements in Intel's EMIB-T substrate technology significantly broaden the possibilities for chiplet integration across a wide range of high-performance computing applications, including AI, HPC, data centers, and edge devices. The fine 25 μm bump pitch and support for HBM4e/UCIe will have a profound impact on future semiconductor design and manufacturing. EMIB-T is expected to accelerate the development of semiconductor solutions offering higher performance, greater power efficiency, and enhanced flexibility, thereby driving the further evolution of the chiplet ecosystem. This technology is poised to become a cornerstone in the industry's overarching heterogeneous integration strategy.

Source: <https://www.bestpcbs.com/blog/2026/10/emib-t-substrate/>

#10 β -Ga₂O₃ MOSFETs: 80x heat transfer area strategy explained

Published October 08, 2026 Southwest Jiaotong University China



OVERVIEW

Researchers at Southwest Jiaotong University, led by Associate Professor Hongkun Li, have devised a hybrid thermal management strategy for β -Ga₂O₃ MOSFETs that combines a diamond thermal spreading layer (TSL) with silicon-substrate-embedded microchannels. This innovative approach achieves superior heat dissipation by increasing the heat spreading angle from 32.2° to 88°, effectively enlarging the heat transfer area by approximately 80 times. This breakthrough directly addresses the critical limitation of β -Ga₂O₃'s inherently low thermal conductivity, paving the way for high-performance power electronics.

Key Findings

A research team spearheaded by Associate Professor Hongkun Li at Southwest Jiaotong University has published a groundbreaking paper in the **International Journal of Heat and Mass Transfer**, detailing a novel hybrid thermal management strategy for β -Ga₂O₃ MOSFETs. This strategy effectively overcomes the inherent low thermal conductivity of β -Ga₂O₃ by utilizing a diamond thermal spreading layer (TSL) in conjunction with silicon-substrate-embedded microchannels, resulting in an extraordinary 80-fold increase in the effective heat transfer area.

Technical / Clinical Details

- The core of this strategy lies in enhancing heat spreading from the localized heat source within the β -Ga₂O₃ MOSFET. Simulation results rigorously demonstrate that the diamond TSL dramatically expands the heat spreading angle from a confined 32.2° to an expansive 88°. This angular increase is the primary mechanism behind the massive enhancement in effective heat transfer area.
- By embedding microchannels directly into the silicon substrate, the system provides an efficient pathway for convective cooling, actively removing the heat spread by the diamond TSL. This dual-layer approach ensures that heat is not only spread effectively but also dissipated rapidly, preventing the formation of detrimental hot spots and maintaining the device's operational integrity.
- This innovative design leverages the ultra-high bandgap and breakdown electric field of β -Ga₂O₃, while critically addressing its weakest link: thermal conductivity. The substantial improvement in thermal management suggests that β -Ga₂O₃ devices can now operate at much higher power densities and frequencies without thermal degradation.

Background & Context

Beta-gallium oxide ($\beta\text{-Ga}_2\text{O}_3$) is recognized as a next-generation ultrawide bandgap semiconductor, offering a superior breakdown voltage and lower power loss compared to existing materials like Si, SiC, and GaN. These properties make it highly desirable for high-power electronic applications. However, its intrinsically low thermal conductivity (typically below 20 W/mK) has historically been a significant bottleneck, impeding the full realization of its potential in high-power-density devices. This research provides a crucial solution, directly mitigating this thermal challenge and accelerating the path to commercialization for $\beta\text{-Ga}_2\text{O}_3$ -based power electronics.

Strategic Significance & Outlook

The successful implementation of this hybrid thermal management strategy marks a critical milestone for the $\beta\text{-Ga}_2\text{O}_3$ semiconductor industry. It offers a viable pathway to unlock the full performance capabilities of $\beta\text{-Ga}_2\text{O}_3$ MOSFETs, which are essential for demanding applications in electric vehicles, renewable energy converters, and data center power supplies. Future work will likely focus on experimental validation of these simulation results, optimizing fabrication processes for manufacturability, and scaling the technology for broader industrial adoption. This advancement is poised to contribute significantly to the development of more compact, efficient, and reliable power electronic systems globally, reinforcing China's position in advanced materials research.

Source: <http://agoa.top/en/News/details.html?id=3632>

Collected: October 09, 2026 | Automated Research System (Gemini API)