

TROY TECHNICAL

ADHESIVES & SEALANTS

WEEKLY REPORT

October 17 - October 23, 2026 | Issue 2026-W42

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

11

ANALYZED ARTICLES

10

PRIORITY THEMES

Issued 2026-10-23 | English edition | fixed approved cover artwork



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

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

SIGNAL 01 | CHEMISTRY

Navitas UHV SiC Modules: 2300V G4H08MT23GB4 Specs and Reliability

Navitas has introduced a 2300V ultra-high-voltage (UHV) SiC power module family featuring a class-leading 8mΩ R DSON.

SIGNAL 02 | FORMULATION

Henkel Component Bonding: Adhesive Selection Framework for 2026

Henkel Adhesive Technologies has launched Component Bonding, a functional classification system for LOCTITE® and TEROSON® adhesives designed to simplify selection for complex material combinations.

SIGNAL 03 | APPLICATION & CURE

Shanren New Materials AS9378X5: Pressureless Sintering Silver Specs

Shanren (Zhejiang) New Materials Technology has developed the AS9378X5 series pressureless sintering silver paste with a record intrinsic thermal conductivity of 326.75W/m·K.

SIGNAL 04 | QUALIFIED PRODUCT

Fluorine-Free Battery Binders: Sustainable LFP Recycling Path

Researchers have developed a fluorine-free, water-soluble binder for battery cathodes to reduce manufacturing costs and environmental impact. This chemistry is designed to make the recycling of lithium-iron-phosphate (LFP) batteries more profitable.

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

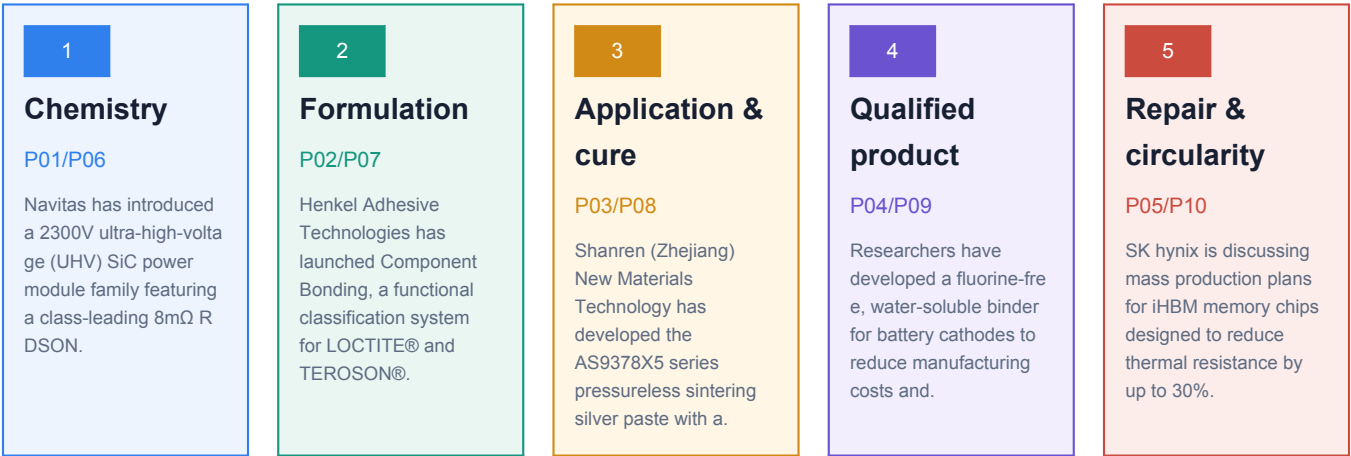
FACT states what the collected English source reports. BUSINESS READ and ACTION are editorial interpretations. UNKNOWN lists information that the source file does not establish. A linked article is not treated as independent confirmation of every claim.

Five numbers or evidence anchors that require conditions

326.75W A05	SOURCE-BOUND CONDITION Shanren (Zhejiang) New Materials Technology has developed the AS9378X5 series pressureless sintering silver paste with a record intrinsic thermal conductivity of 326.75W/m·K.
30% A09	SOURCE-BOUND CONDITION SK hynix is discussing mass production plans for iHBM memory chips designed to reduce thermal resistance by up to 30%.
1245% A11	SOURCE-BOUND CONDITION Researchers have developed an EVA composite film using a boron nitride hybrid network that increases through-plane thermal conductivity by 1245% to 2.96 W/m-K.
P04 A10	SOURCE-BOUND CONDITION Researchers have developed a fluorine-free, water-soluble binder for battery cathodes to reduce manufacturing costs and environmental impact.
P05 A09	SOURCE-BOUND CONDITION SK hynix is discussing mass production plans for iHBM memory chips designed to reduce thermal resistance by up to 30%.
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.



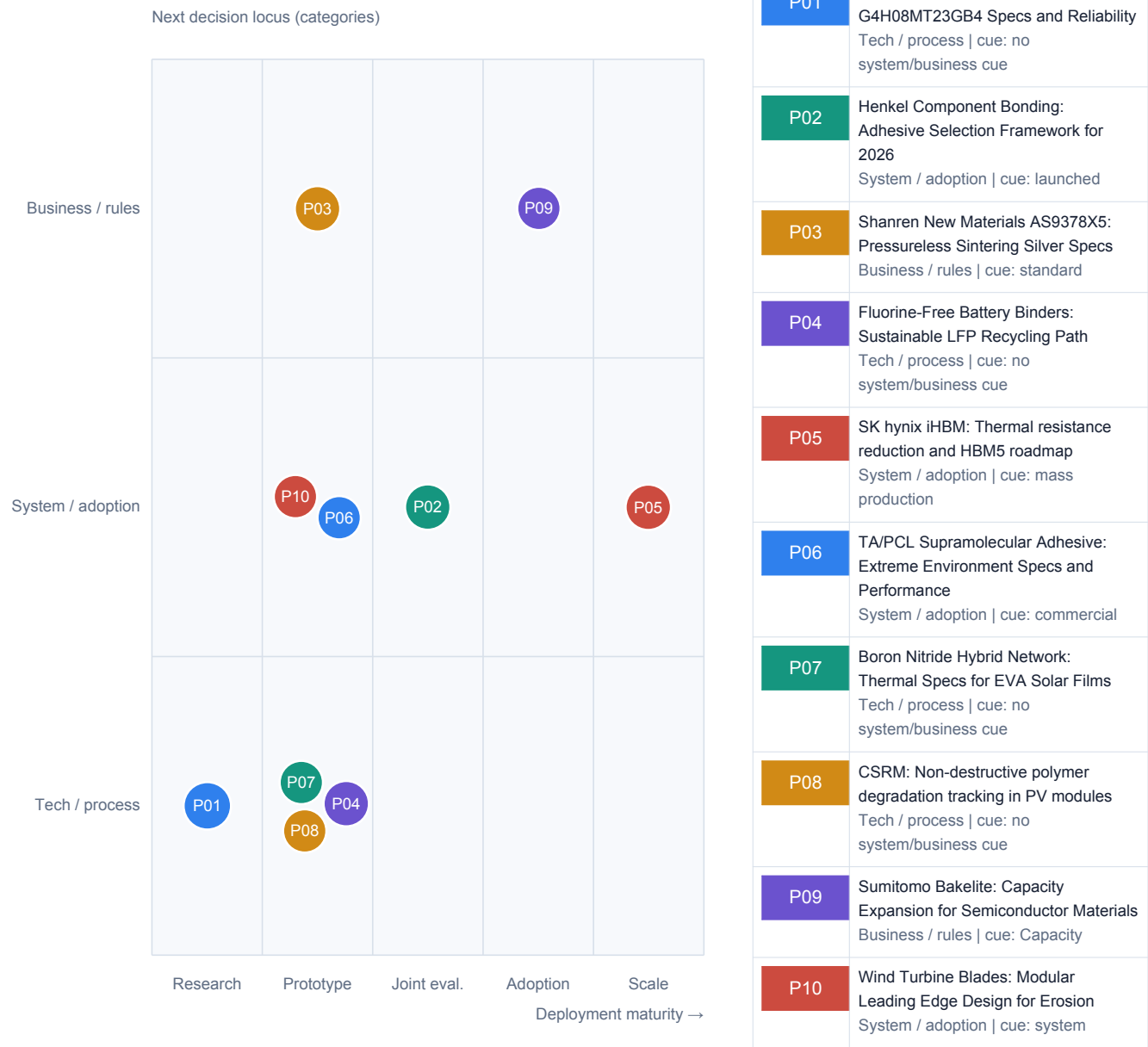
EVIDENCE REQUIRED AT EACH HANDOFF

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

Navitas UHV SiC Modules: 2300V G4H08MT23GB4 Specs and Reliability

A04 | Chemistry | Research

Date not stated

FACT

Navitas has introduced a 2300V ultra-high-voltage (UHV) SiC power module family featuring a class-leading 8mΩ R DSON. Utilizing fourth-generation GeneSiC Trench-Assisted Planar (TAP) architecture, these modules target efficiency gains in AI data center power rails, grid-scale storage, and EV megawatt charging.

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 1/5 | DECISION LOCUS: TECH / PROCESS

P02

Henkel Component Bonding: Adhesive Selection Framework for 2026

A02 | Formulation | Joint evaluation

Date not stated

FACT

Henkel Adhesive Technologies has launched Component Bonding, a functional classification system for LOCTITE® and TEROSON® adhesives designed to simplify selection for complex material combinations. The system introduces a four-category framework and a new adhesive-primer combination for difficult-to-bond polyolefins. This approach integrates surface preparation and adhesive application to optimize joint performance in automotive and industrial maintenance.

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 3/5 | DECISION LOCUS: SYSTEM / ADOPTION

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

P03

Shanren New Materials AS9378X5: Pressureless Sintering Silver Specs

A05 | Application & cure | Pilot

Date not stated

FACT

Shanren (Zhejiang) New Materials Technology has developed the AS9378X5 series pressureless sintering silver paste with a record intrinsic thermal conductivity of 326.75W/m·K. This material enables high-density sintering in standard reflow ovens without external pressure, providing a domestic alternative to imported high-end packaging materials for third-generation semiconductors.

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 2/5 | DECISION LOCUS: BUSINESS / RULES

P04

Fluorine-Free Battery Binders: Sustainable LFP Recycling Path

A10 | Qualified product | Pilot

Date not stated

FACT

Researchers have developed a fluorine-free, water-soluble binder for battery cathodes to reduce manufacturing costs and environmental impact. This chemistry is designed to make the recycling of lithium-iron-phosphate (LFP) batteries more profitable.

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: TECH / PROCESS

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

P05

SK hynix iHBM: Thermal resistance reduction and HBM5 roadmap

A09 | Repair & circularity | Scale-up

Date not stated

FACT

SK hynix is discussing mass production plans for iHBM memory chips designed to reduce thermal resistance by up to 30%. By integrating cooling elements directly into the package, the company seeks to overcome heat dissipation bottlenecks inherent in HBM stacks.

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 5/5 | DECISION LOCUS: SYSTEM / ADOPTION

P06

TA/PCL Supramolecular Adhesive: Extreme Environment Specs and Performance

A06 | Chemistry | Pilot

Date not stated

FACT

Researchers at Peking University developed a solvent-free supramolecular adhesive using tannic acid (TA) and polyε-caprolactone (PCL) that maintains high strength from room temperature down to -196°C. The material achieves a lap shear strength of 8.5 MPa at 25°C and 6.6 MPa at -196°C, outperforming commercial EVA and other advanced adhesives. This biomimetic design enables high-strength bonding in aerospace, polar exploration, and marine environments.

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 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

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

P07

Boron Nitride Hybrid Network: Thermal Specs for EVA Solar Films

A11 | Formulation | Pilot

Date not stated

FACT

Researchers have developed an EVA composite film using a boron nitride hybrid network that increases through-plane thermal conductivity by 1245% to 2.96 W/m-K. This material reduces photovoltaic module temperatures by 5.34 degrees Celsius while maintaining high electrical insulation and mechanical toughness. The breakthrough enables passive cooling in solar panels without compromising the structural integrity of the encapsulant.

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 2/5 | DECISION LOCUS: TECH / PROCESS

P08

CSRM: Non-destructive polymer degradation tracking in PV modules

A08 | Application & cure | Pilot

Date not stated

FACT

Researchers in Germany have demonstrated that compressive stress relaxation measurement (CSRM) can monitor polymer degradation in aging photovoltaic modules. The study found that PV module power degradation correlates with the initial cross-linking state of encapsulants, providing a non-destructive method for reliability prediction.

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

Sumitomo Bakelite: Capacity Expansion for Semiconductor Materials

A03 | Qualified product | Product adoption

Date not stated

FACT

Sumitomo Bakelite is expanding production capacity for advanced semiconductor encapsulation materials at its Suzhou, China, and Singapore facilities. The expansion focuses on SUMIKONTM EME molded underfill (MUF) and compression-molding granules to meet rising demand for generative AI and communications satellite hardware.

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: BUSINESS / RULES

P10

Wind Turbine Blades: Modular Leading Edge Design for Erosion

A07 | Repair & circularity | Pilot

Date not stated

FACT

Researchers in Germany have developed a wind turbine blade featuring a replaceable leading edge to combat rain-induced erosion. By utilizing a modular design with detachable adhesive joints, the system aims to restore turbine efficiency without replacing the entire rotor blade.

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 2/5 | 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 01-11

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	Liquid Metal TIM: 2-Year Analysis of Metal Chemical Reactions	https://wccftech.com/liquid-metal-tim-2-year-analysis-aluminum-copper-reaction/
A02	Henkel Component Bonding: Adhesive Selection Framework for 2026	https://www.industriaquimica.es/noticias/20261023/henkel-adhesive-technologies-presenta-sus-nuevas-soluciones-simplificar-seleccion-tecnologias-adhesion
A03	Sumitomo Bakelite: Capacity Expansion for Semiconductor Materials	https://www.chemengonline.com/sumitomo-bakelite-to-expand-encapsulation-materials-capacity-in-china-singapore/
A04	Navitas UHV SiC Modules: 2300V G4H08MT23GB4 Specs and Reliability	https://www.semiconductor-today.com/news_items/2026/oct/navitas-211026.shtml
A05	Shanren New Materials AS9378X5: Pressureless Sintering Silver Specs	https://news.cnpowder.com.cn/91931.html
A06	TA/PCL Supramolecular Adhesive: Extreme Environment Specs and Performance	https://news.qq.com/rain/a/20261023A0315S00
A07	Wind Turbine Blades: Modular Leading Edge Design for Erosion	https://www.ecoportal.net/en/lab-germany-built-wind-turbine-blade/43693/
A08	CSRM: Non-destructive polymer degradation tracking in PV modules	https://www.pv-magazine-india.com/2026/10/21/non-destructive-testing-tracking-polymer-degradation-in-pv-modules/
A09	SK hynix iHBM: Thermal resistance reduction and HBM5 roadmap	https://wccftech.com/sk-hynix-starts-discussing-mass-production-plans-for-ihbm-memory-chips-that-aim-to-improve-heat-resistance-by-30-says-report/
A10	Fluorine-Free Battery Binders: Sustainable LFP Recycling Path	https://cen.acs.org/materials/energy-storage/battery-cathode-binder-fluorine-free-recycle/104/web/2026/10
A11	Boron Nitride Hybrid Network: Thermal Specs for EVA Solar Films	https://bioengineer.org/boron-nitride-hybrid-network-cools-solar-panels-while-keeping-films-tough/

Adhesives_Sealants — Selected Articles

Date: 2026-10-25

Articles: 11

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- #11 Boron Nitride Hybrid Network: Thermal Specs for EVA Solar Films

#01 Liquid Metal TIM: 2-Year Analysis of Metal Chemical Reactions

Published October 16, 2026 Wccftech USA



OVERVIEW

A two-year analysis reveals that while liquid metal thermal interface materials (TIM) provide excellent initial thermal conductivity, they cause long-term degradation through chemical reactions with aluminum and copper. These reactions can lead to structural failure in aluminum and the formation of crystals on copper, reducing overall thermal performance over time.

Key Findings

Long-term use of liquid metal TIM, specifically gallium, results in significant material degradation depending on the metal substrate. While it offers superior initial thermal resistance compared to paste or graphene pads, the chemical reactions it triggers can erode heatsinks and silicon crystals, eventually compromising the cooling performance it was intended to enhance.

Technical Details

The analysis highlights distinct reactions across different metals:

- **Aluminum:** Gallium causes "grain boundary diffusion," where the liquid metal seeps into the metal's boundaries. This process can effectively destroy the aluminum structure within 30 minutes of application.
- **Copper:** While the internal structure remains intact, gallium reacts with the top layer to form a compound with a lower melting point and inferior thermal conductivity compared to pure copper. After 24 months, this manifests as the appearance of crystals on the surface.
- **Nickel:** Nickel is the most resistant of the tested metals, though it is not immune. Nickel-coated copper heatsinks experience similar degradation, albeit at a slower rate.

Background and Context

The adoption of liquid metal is driven by the increasing power density of GPUs. For example, the RTX 5080 possesses three times the power density per mm² compared to the 8800 GTX from nearly a decade ago. Liquid metal is utilized to manage this heat, but its effectiveness is a "double-edged sword" because the same chemical reactivity that lowers thermal resistance also causes the aforementioned material degradation.

Significance and Outlook

For users prioritizing long-term stability over peak initial performance, the analysis suggests alternatives such as PTM7950, a solidified pad. While liquid metal may provide higher initial gains, maintaining its performance requires replacing the material every year to mitigate the effects of the ongoing chemical reactions with the hardware.

Source: <https://wccftech.com/liquid-metal-tim-2-year-analysis-aluminum-copper-reaction/>

Collected: October 24, 2026 | Automated Research System (AI)

#02 Henkel Component Bonding: Adhesive Selection Framework for 2026

Published October 23, 2026 Industria Química スペイン



OVERVIEW

Henkel Adhesive Technologies has launched Component Bonding, a functional classification system for LOCTITE® and TEROSON® adhesives designed to simplify selection for complex material combinations. The system introduces a four-category framework and a new adhesive-primer combination for difficult-to-bond polyolefins. This approach integrates surface preparation and adhesive application to optimize joint performance in automotive and industrial maintenance.

Key Findings

Henkel Adhesive Technologies has introduced Component Bonding, a system designed to streamline the selection of LOCTITE® and TEROSON® technologies. The framework shifts the selection process to start with a technical question regarding the required function of the joint in service—such as process speed, strength, or elasticity—rather than starting with the material. This approach is marketed under the slogan “Your Challenge. Bonded.”

Technical Details

The Component Bonding system categorizes adhesive solutions into four functional groups to narrow down compatible technologies based on application requirements:

- **FAST:** Prioritizes productivity and speed.
- **STRONG:** Focuses on high strength and durability.
- **ELASTIC:** Designed for joints subject to vibration, deformation, or movement.
- **SPECIAL:** Reserved for applications with specialized requirements.

As part of this launch, Henkel introduced a specific solution for low surface energy plastics: the LOCTITE® 472 instant adhesive combined with the LOCTITE® SF 772 primer for polyolefins. LOCTITE® SF 772 prepares the surface to improve wetting and adhesion, followed by the low-viscosity LOCTITE® 472. According to Henkel tests, this combination can achieve fixation times of less than 10 seconds. In polyolefin joints, the strength can be up to eight times higher than joints created without the primer. This system enables the bonding of polypropylene, polyethylene, and multi-material assemblies, including plastic-to-metal joints.

Background & Context

The need for this framework arises from the increasing use of lightweight materials, composites, recycled materials, and low surface energy plastics. Dr. Niamh O'Reilly, Vice President of Innovation and Application Engineering at Henkel, notes that while these materials offer new design possibilities, they complicate the selection of bonding solutions. The system addresses this by treating surface preparation—including cleaning and the use of adhesion promoters—and adhesive application as a single integrated process.

Significance & Outlook

Component Bonding provides a unified framework for engineers, maintenance professionals, and vehicle repair specialists to identify solutions based on real-world operating conditions. By integrating technical validation of materials and assembly processes, the system aims to reduce the complexity of achieving high-performance joints in multi-material environments.

Source: <https://www.industriaquimica.es/noticias/20261023/henkel-adhesive-technologies-presenta-sus-nuevas-soluciones-simplificar-seleccion-tecnologias-adhesion>

#03 Sumitomo Bakelite: Capacity Expansion for Semiconductor Materials

Published October 19, 2026 Chemical Engineering USA



OVERVIEW

Sumitomo Bakelite is expanding production capacity for advanced semiconductor encapsulation materials at its Suzhou, China, and Singapore facilities. The expansion focuses on SUMIKON™ EME molded underfill (MUF) and compression-molding granules to meet rising demand for generative AI and communications satellite hardware.

Key Findings

Sumitomo Bakelite Co., Ltd. is increasing its production capacity for encapsulation materials used in advanced semiconductor packages. The company will install new production lines for SUMIKON™ EME molded underfill (MUF) materials and compression-molding granules at its manufacturing sites in Singapore and Suzhou, China.

Technical Details

The expansion targets two specific material categories designed for high-density packaging:

- **SUMIKON™ EME Molded Underfill (MUF):** These materials are engineered for low-warpage characteristics and high filling performance in microscopic gaps. The MUF process allows for the filling of solder joints and the encapsulation of the entire package within a single molding process, increasing both manufacturing efficiency and reliability.
- **Compression-Molding Granules:** These granules are optimized for narrow-gap filling through the precise control of resin viscosity, filler size, and particle-size distribution. This technical configuration enables uniform molding and low warpage, even when applied to large panels.

Background and Context

The decision to expand capacity is driven by a rapid increase in demand for advanced semiconductors in China and Southeast Asia. This growth is primarily linked to the development of communications satellites and generative AI. Simultaneously, the industry is seeing a trend toward semiconductor packages that are increasingly large, thin, and dense, necessitating materials that can maintain structural integrity and precision.

Significance and Outlook

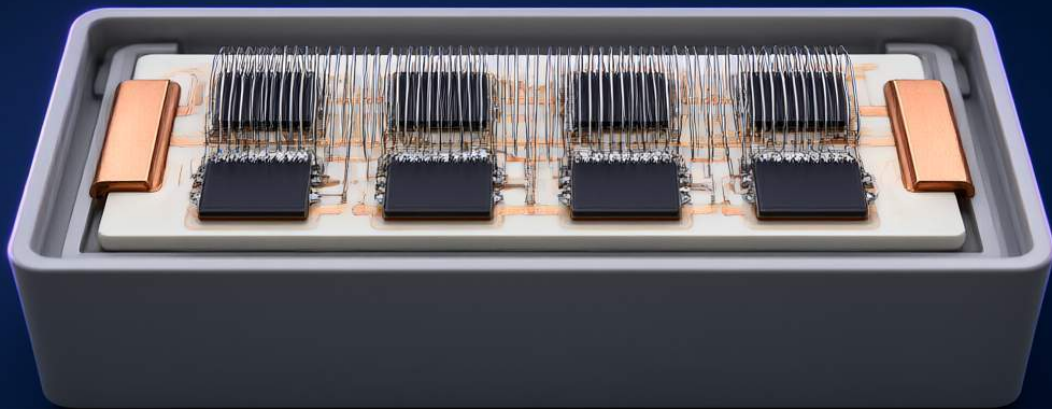
By expanding its footprint in Suzhou and Singapore, Sumitomo Bakelite intends to respond more reliably and promptly to the evolving requirements of advanced semiconductor manufacturing. The deployment of these specific MUF and compression-molding technologies aims to improve overall productivity for manufacturers dealing with the complexities of next-generation, high-density semiconductor packaging.

Source: <https://www.chemengonline.com/sumitomo-bakelite-to-expand-encapsulation-materials-capacity-in-china-singapore/>

Collected: October 24, 2026 | Automated Research System (AI)

#04 Navitas UHV SiC Modules: 2300V G4H08MT23GB4 Specs and Reliability

Published October 21, 2026 Semiconductor Today USA



OVERVIEW

Navitas has introduced a 2300V ultra-high-voltage (UHV) SiC power module family featuring a class-leading 8mΩ R DSON. Utilizing fourth-generation GeneSiC Trench-Assisted Planar (TAP) architecture, these modules target efficiency gains in AI data center power rails, grid-scale storage, and EV megawatt charging.

Key Findings

Navitas has launched the G4H08MT23GB4 2300V full-bridge power module family, designed for advanced energy and grid infrastructure. The modules utilize the industry-standard SiCPAK form factor and achieve a class-leading R_{DS(on)} of 8mΩ. This release expands the company's UHV SiC portfolio, which includes both 2300V and 3300V options.

Technical Details

The modules are built on Navitas' fourth-generation GeneSiC Trench-Assisted Planar (TAP) architecture. To ensure high-reliability operation in high-power environments, the construction includes several specific enhancements:

- **Substrate:** An aluminium nitride (AlN) active-metal-braze (AMB) substrate provides superior heat spreading and isolation capabilities exceeding 5kV.
- **Potting:** Epoxy-resin potting is used to limit moisture and contaminant ingress and reduce internal stress; this technology offers 10x the thermal conductivity of silicone gel.
- **Connectivity:** High-current, press-fit pins provide twice the current-carrying capability per pin compared to standard press-fit connections.
- **Thermal Management:** An optional pre-applied thermal interface material (TIM) is available to standardize heat-sink assembly.

Reliability Testing

The product family is qualified to an internal AEC-Plus reliability benchmark that exceeds AEC-Q101 and JEDEC standards. This testing regime includes dynamic reverse bias (DRB) and dynamic gate switching (DGS) to simulate fast-switching application profiles. Furthermore, the benchmark more than triples the duration of static high-temperature, high-voltage tests (HTRB, HTGB, HTGB-R) and includes HV-H3TRB (HV-THB) qualification for discrete, power modules, and known-good-die (KGD) devices.

Significance and Outlook

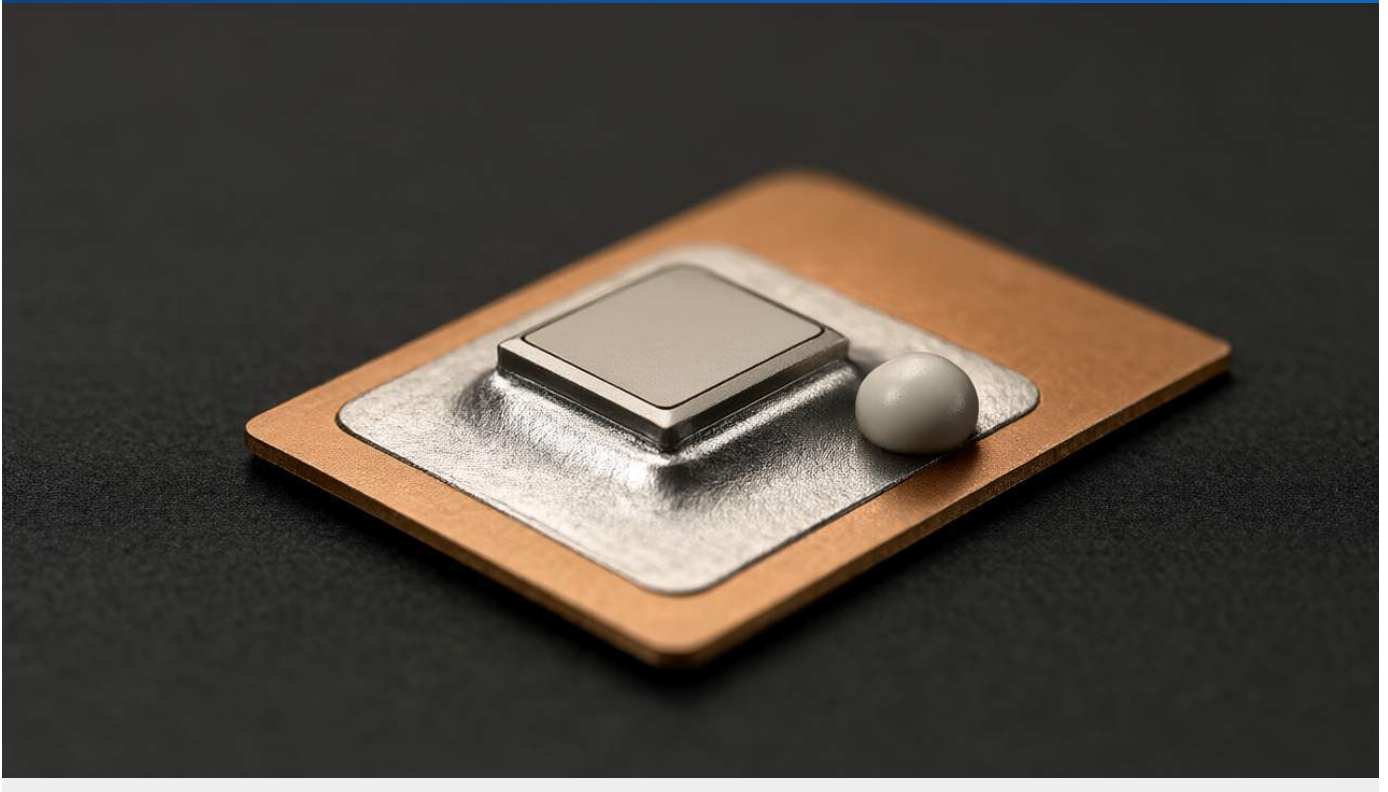
These UHV SiC modules serve as medium-voltage building blocks for solid-state transformers. In AI data centers, they enable the direct conversion of grid power into high-voltage DC rails used within server racks. Beyond AI infrastructure, the technology is positioned for use in solar inverters, grid-scale battery energy storage systems, hydrogen fuel cell electrolysis, DC–DC conversion, industrial motor-drives, and EV megawatt charging infrastructure.

Source: https://www.semiconductor-today.com/news_items/2026/oct/navitas-211026.shtml

Collected: October 24, 2026 | Automated Research System (AI)

#05 Shanren New Materials AS9378X5: Pressureless Sintering Silver Specs

Published October 21, 2026 中国粉体网 (news.cnpowder.com.cn) China



OVERVIEW

Shanren (Zhejiang) New Materials Technology has developed the AS9378X5 series pressureless sintering silver paste with a record intrinsic thermal conductivity of $326.75\text{W/m}\cdot\text{K}$. This material enables high-density sintering in standard reflow ovens without external pressure, providing a domestic alternative to imported high-end packaging materials for third-generation semiconductors.

Key Findings

The AS9378X5 series pressureless sintering silver paste has achieved an intrinsic thermal conductivity of 326.75W/m·K, setting a new performance benchmark for domestic pressureless sintering silver. The material exhibits a thermal diffusivity of 69.1mm²/s and maintains a porosity level below 3%, resulting in a density close to that of bulk pure silver.

Technical Details

Verification was conducted using the TPS transient plane source (Hot Disk) standard method with a 50mm×50mm pure copper substrate sandwich structure. The material's mechanical and process specifications include:

- **Mechanical Strength:** Sintered joint shear strength exceeds 35MPa.
- **Thermal Stability:** Capable of withstanding thermal cycle shocks across a wide temperature range from -55°C to 175°C, meeting automotive-grade power device reliability requirements.
- **Process Consistency:** During continuous 8-hour printing, viscosity fluctuation remained below 8%, producing uniform thickness and clean line edges for mass production.

Background and Context

Unlike traditional pressure-sintering silver pastes that require external pressure to achieve densification, the AS9378X5 series completes the process under standard reflow oven conditions. This pressureless approach is specifically designed for low-stress packaging of large-size SiC power chips and IGBT modules, reducing the risk of stress damage to thin chips and ceramic substrates.

Significance and Outlook

The AS9378X5 series is IATF16949 certified and currently serves multiple power semiconductor packaging companies in the Yangtze River Delta. Applications span electric vehicle drive controllers, photovoltaic energy storage inverters, 5G RF power amplifier modules, and industrial power supplies. By breaking the technical monopoly of overseas manufacturers, this material reduces costs and delivery cycles for the domestic power semiconductor industry. As SiC devices move toward higher power densities and operating temperatures, high-thermal-conductivity pressureless sintering silver is becoming a standard core material for power packaging.

Source: <https://news.cnpowder.com.cn/91931.html>

Collected: October 24, 2026 | Automated Research System (AI)

#06 TA/PCL Supramolecular Adhesive: Extreme Environment Specs and Performance

Published October 23, 2026 腾讯新闻 (高分子科学前沿) China



OVERVIEW

Researchers at Peking University developed a solvent-free supramolecular adhesive using tannic acid (TA) and polyε-caprolactone (PCL) that maintains high strength from room temperature down to -196°C . The material achieves a lap shear strength of 8.5 MPa at 25°C and 6.6 MPa at -196°C , outperforming commercial EVA and other advanced adhesives. This biomimetic design enables high-strength bonding in aerospace, polar exploration, and marine environments.

Key Findings

The TA/PCL supramolecular adhesive demonstrates exceptional stability across extreme temperature ranges and chemical environments. The optimal formulation, TA1/PCL3, achieves a maximum lap shear strength of 8.5 MPa on glass at 25°C and retains a strength of 6.6 MPa after 24 hours of treatment at -196°C. Even after 180 days of storage in liquid nitrogen, the adhesive maintains a strength of 6.2 MPa. Furthermore, the material remains stable after 24 hours of immersion in 1 M HCl, 1 M NaOH, saturated NaCl, and organic solvents such as ethanol, n-hexane, CCl₄, and DMSO.

Technical Details

The adhesive is produced via solvent-free thermal blending of natural polyphenol TA and semi-crystalline polyester PCL at 80°C. The performance is governed by the synergy between semi-crystalline PCL domains, which provide cohesive strength, and a dynamic TA-mediated hydrogen bond network that enables energy dissipation. Key technical specifications include:

- **Crystallinity Control:** Adjusting the molar ratio of TA hydroxyl donors to PCL ester oxygen acceptors inhibits excessive crystallization, balancing softness and rigidity.
- **Thermal Properties:** The material melts at approximately 42°C and remains solid at 37°C, making it safe for contact with human tissue.
- **Rapid Sealing:** The adhesive can seal leaks in 60 seconds and withstand hydrostatic pressure from a 1.6 m water column (approximately 120 mmHg).
- **Molecular Stability:** DFT calculations show a binding energy of -43.6 kJ·mol⁻¹ between TA hydroxyls and PCL ester carbonyls. MD simulations confirm that the hydrogen bond network remains nearly unchanged between 25°C and -196°C.

Significance and Outlook

By avoiding complex organic synthesis or protein engineering, this low-cost, scalable manufacturing process provides a new biomimetic paradigm for extreme-environment adhesives. The ability to maintain a nearly constant modulus between -110°C and -30°C and resist dissolution in solvents that typically fail commercial EVA makes it highly suitable for aerospace, polar exploration, and marine anti-corrosion applications.

Source: <https://news.qq.com/rain/a/20261023A0315S00>

Collected: October 24, 2026 | Automated Research System (AI)

#07 Wind Turbine Blades: Modular Leading Edge Design for Erosion

Published October 23, 2026 The Pulse (ecoportal.net) Germany



OVERVIEW

Researchers in Germany have developed a wind turbine blade featuring a replaceable leading edge to combat rain-induced erosion. By utilizing a modular design with detachable adhesive joints, the system aims to restore turbine efficiency without replacing the entire rotor blade.

Key Findings

A German applied research institute, as part of an EU project, has developed a wind turbine blade with a modular leading edge that can be peeled off and replaced in one strip. This design addresses the critical failure point where rain and wind erode the blade's front edge at speeds exceeding 185 mph, which can reduce a utility-scale turbine's annual energy production by up to 5 percent.

Technical Details

Unlike conventional blades—which consist of two glass fiber laminate shells bonded into a single closed structure—this research blade utilizes a modular architecture. The design features:

- **Load-Bearing Spar:** A continuous profile created via pultrusion, where fibers are drawn through a resin bath and cured in a heated die.
- **Replaceable Edge:** A leading edge constructed from natural fiber-reinforced thermoplastics.
- **Detachable Joint:** A specialized adhesive joint that allows the worn strip to be released and replaced, rather than permanently locking the layers together.
- **Sustainable Materials:** The use of natural fiber thermoplastics improves reuse and recycling compared to glass fiber systems.

A demonstrator segment presented at a Munich trade fair showcased these components, including ribs repurposed from a decommissioned rotor blade.

Background & Context

Conventional blades, which can exceed 260 feet in length, are typically discarded as a single unit even if only the leading edge is damaged. This is because the adhesives used in traditional construction do not allow for the selective removal of the edge. This inefficiency contributes to tens of thousands of tons of composite waste in Europe annually, a significant issue as EU rules bar landfilling.

Significance & Outlook

The project, coordinated by a technical university in Italy with roughly 20 European research and industry partners, proves the viability of the joint and materials. While the demonstrator has not yet faced real-world conditions such as salt spray, hail, or ice, a successful implementation would allow crews to replace only the damaged strip, extending the operational life of the turbine.

Source: <https://www.ecoportal.net/en/lab-germany-built-wind-turbine-blade/43693/>

Collected: October 24, 2026 | Automated Research System (AI)

#08 CSRM: Non-destructive polymer degradation tracking in PV modules

Published October 21, 2026 pv magazine India Germany



OVERVIEW

Researchers in Germany have demonstrated that compressive stress relaxation measurement (CSRM) can monitor polymer degradation in aging photovoltaic modules. The study found that PV module power degradation correlates with the initial cross-linking state of encapsulants, providing a non-destructive method for reliability prediction.

Key Findings

The research indicates that CSRM can effectively track mechanical changes in the rear side of PV modules during weathering. In damp heat (DH) testing, the power degradation of the modules correlated with the initial cross-linking state of the encapsulants. While encapsulants initially showed an increase in cross-linking during the first 250 hours of DH testing, both the encapsulant and backsheet eventually degraded, leading to a decrease in the CSRM response. Furthermore, combined DH and ultraviolet (UV) weathering caused post-cross-linking within the first 250 hours, which leveled the cross-linking states and resulted in similar power degradation across samples.

Technical Details

The team utilized 200 mm × 200 mm mini-modules consisting of passivated emitter and rear contact (PERC) solar cells, ethylene vinyl acetate (EVA) encapsulants, and polyethylene/polyethylene terephthalate (PET) backsheets. To vary cross-linking degrees, lamination times at 155 C were adjusted. The CSRM process involved the following parameters:

- Test location heated to 89 C.
- A 4 mm steel tip pressed approximately 100 µm into the rear surface.
- Application of a force of less than 20 N.
- Measurement of force decline while maintaining constant indentation depth.

Modules underwent DH testing (85 C, 85% relative humidity) for up to 3,500 hours, or combined DH+UV testing (85 C, 60% relative humidity, 227 W/m² irradiance) for up to 2,000 hours, with CSRM and electrical measurements taken every 250 hours.

Background & Context

CSRM is traditionally a non-destructive technique used in manufacturing quality control to assess encapsulant cross-linking after lamination. This study, conducted by scientists from Germany's Anhalt University of Applied Sciences and Fraunhofer CSP, expanded its use to monitor the mechanical response of the rear side of modules during aging. Solvent tests and thermal analyses were used to decouple the degradation of the encapsulant from that of the backsheet.

Significance & Outlook

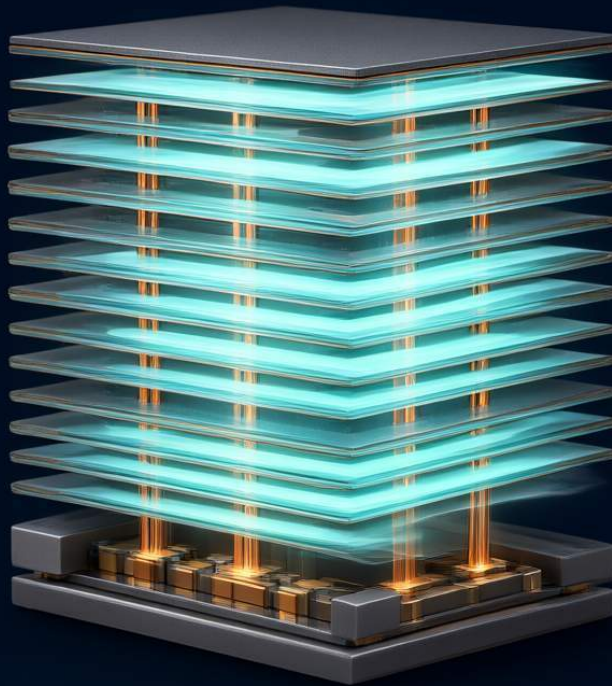
The study highlights that the backsheet undergoes chain scission and post-crystallization during degradation. The researchers conclude that overacceleration in testing must be avoided to ensure realistic reliability predictions for PV modules.

Source: <https://www.pv-magazine-india.com/2026/10/21/non-destructive-testing-tracks-polymer-degradation-in-pv-modules/>

Collected: October 24, 2026 | Automated Research System (AI)

#09 SK hynix iHBM: Thermal resistance reduction and HBM5 roadmap

Published October 21, 2026 Wccftch USA



OVERVIEW

SK hynix is discussing mass production plans for iHBM memory chips designed to reduce thermal resistance by up to 30%. By integrating cooling elements directly into the package, the company seeks to overcome heat dissipation bottlenecks inherent in HBM stacks.

Key Findings

SK hynix has begun consultations with domestic and foreign materials and equipment suppliers regarding the mass production and commercialization of its next-generation iHBM memory. The primary objective of this technology is to mitigate heat generation and improve heat resistance by 30% compared to traditional HBM designs.

Technical Details

Standard HBM chips are constructed by stacking DRAM modules on a base die, which is connected to a silicon interposer and then to a package substrate. This architecture often traps heat in the middle of the stack, as heat must travel both upwards toward heat spreaders and cold plates, and downwards toward the system's heatsink.

To resolve these limitations, iHBM introduces Integrated Cooling Elements (ICE). These cooling components are placed within the die-to-die physical layer (D2D PHY) to directly improve heat dissipation from within the package.

Background & Context

The development of iHBM follows the company's current focus on HBM4 memory chips. According to reports from ETNews, SK hynix intends to apply iHBM technology to its future HBM5 chips. Because the iHBM technology will utilize SK hynix's existing Mass Reflow-Molded Underfill (MR-MUF) technology, the company expects the establishment of the necessary supply chain to be similar to its current operational framework.

Significance & Outlook

The shift toward iHBM represents a strategic move to address the thermal ceiling of high-bandwidth memory. By integrating cooling elements directly into the physical layer, SK hynix aims to bypass the traditional reliance on external cooling solutions that only sit at the top or bottom of the DRAM stack. The successful commercialization of iHBM will be critical for the performance stability of next-generation HBM5 memory.

Collected: October 24, 2026 | Automated Research System (AI)

#10 Fluorine-Free Battery Binders: Sustainable LFP Recycling Path

Published October 20, 2026 C&EN (ACS) USA



OVERVIEW

Researchers have developed a fluorine-free, water-soluble binder for battery cathodes to reduce manufacturing costs and environmental impact. This chemistry is designed to make the recycling of lithium-iron-phosphate (LFP) batteries more profitable.

Key Findings

A new recipe for a cathode binder—the "glue" that holds battery materials together—has been developed to simplify the production and recycling of lithium-ion batteries. This fluorine-free and water-soluble binder is designed to reduce the reliance on toxic solvents and lower the energy consumption required during the manufacturing process.

Technical Details

The research, published in *Nat. Commun.* 2026 (DOI: 10.1038/s41467-026-78215-3), focuses on replacing traditional binders with a water-soluble alternative. By eliminating fluorine from the binder composition, the process minimizes the use of hazardous chemicals and reduces the overall environmental footprint of battery assembly.

Background & Context

Current lithium-ion battery production is characterized by high costs, energy-intensive processes, and complex recycling requirements. These challenges are particularly acute for lithium-iron-phosphate (LFP) batteries, which currently dominate the global electric vehicle (EV) market but have historically been difficult to recycle profitably.

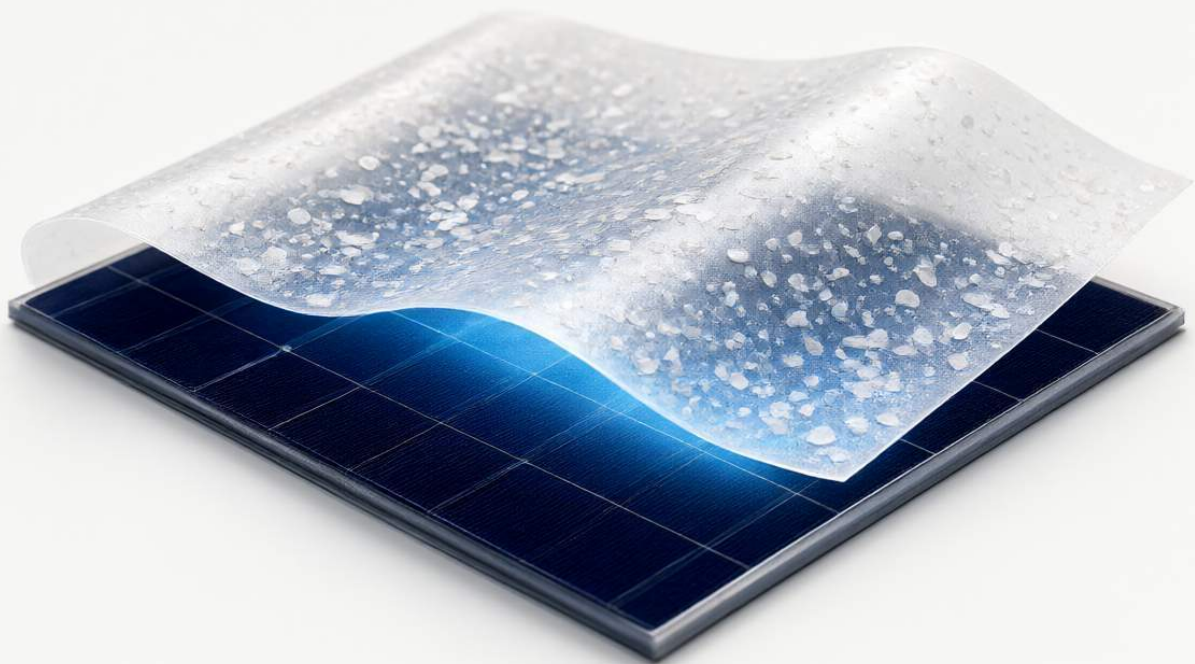
Significance & Outlook

The shift toward a fluorine-free binder has direct implications for the circular economy of EV batteries. According to Sunghun Choi, a battery engineer at Kangwon National University, the binder is a critical component because it influences both the operational performance of the battery and the ease with which materials can be recovered at the end of the battery's life. By simplifying the chemical composition of the cathode, this technology aims to make the recovery of materials from LFP batteries economically viable.

Source: <https://cen.acs.org/materials/energy-storage/battery-cathode-binder-fluorine-lfp-recycle/104/web/2026/10>

#11 Boron Nitride Hybrid Network: Thermal Specs for EVA Solar Films

Published October 19, 2026 BIOENGINEER.ORG China



OVERVIEW

Researchers have developed an EVA composite film using a boron nitride hybrid network that increases through-plane thermal conductivity by 1245% to 2.96 W/m-K. This material reduces photovoltaic module temperatures by 5.34 degrees Celsius while maintaining high electrical insulation and mechanical toughness. The breakthrough enables passive cooling in solar panels without compromising the structural integrity of the encapsulant.

Key Findings

A team of Chinese materials scientists has engineered an ethylene–vinyl acetate (EVA) composite that achieves a through-plane thermal conductivity of 2.96 watts per meter-kelvin, representing a 1245 percent increase over pure EVA. Despite a high filler loading of 110 parts per hundred resin (phr), the film retains a tensile strength of 8.99 megapascals and an elongation at break of 89.75 percent. Additionally, the material maintains electrical isolation with a volume resistivity exceeding 10^{14} ohm-centimeters.

Technical Details

The researchers employed a three-tier design strategy to overcome the trade-off between thermal conductivity and mechanical flexibility:

- **Matrix Crosslinking:** The EVA matrix is crosslinked (cEVA) to improve structural integrity and prevent the brittleness typically associated with high filler loads.
- **Hybrid Filler Architecture:** The team utilized a "sheet-sphere hybrid network" (f-BN) combining hexagonal boron nitride microplatelets and spherical boron nitride microspheres. The platelets provide high-conductivity surfaces, while the spheres fill gaps to reduce thermal resistance at junctions.
- **Interfacial Engineering:** To bridge the organic polymer and inorganic filler, the team used 3-aminopropyltriethoxysilane (KH550). This creates a dual-anchored interface using both covalent bonds and hydrogen bonds, reducing phonon scattering and improving load transfer.

Background & Context

EVA is widely used as a solar encapsulant due to its cost and transparency, but its nature as a thermal insulator causes heat to linger, degrading both the solar cells and the film. While boron nitride is an ideal filler due to its electrical insulation and thermal conductivity, high loadings usually make films too brittle for fabrication.

Significance & Outlook

Beyond conduction, the composite exhibits a solar reflectance of 91.09 percent and an infrared emissivity of 96.17 percent. This allows the film to reflect unused sunlight and radiate absorbed heat. Together, these properties result in a 5.34 degrees Celsius temperature reduction in modules, which is critical for maintaining silicon cell efficiency and extending module lifetimes through passive cooling.

Source: <https://bioengineer.org/boron-nitride-hybrid-network-cools-solar-panels-while-keeping-films-tough/>

Collected: October 24, 2026 | Automated Research System (AI)