

Materials & Chemistry

Field Intelligence Report

Vol. 49 | 2026.07.06 — 07.12 | Articles: 133

Functional Materials / Polymers & Resins / Nanotechnology / Adhesives & Encapsulants

Market Mood

75

/ 100 Optimistic

Advanced Materials Innovation & Circularity

AI, Nanotechnology, and Sustainable Practices Drive Next-Gen Materials Across Key Industries.

Chemical Recycling Market Value	Aerospace Adhesives Market Value	Solid-State Battery Critical Current Density	Graphene Production Capacity (GMG)
\$25.79 Billion	\$2.09 Billion	>300%	10 tons/year
Projected by 2035	Projected by 2033	Achieved in research	New plant operational

Weekly Summary

AI, nanotechnology, and circularity are reshaping materials. AI accelerates battery/magnet development. Chemical recycling scales for sustainability and PFAS compliance. High-performance adhesives are critical for semiconductors and aerospace. Western players must leverage these trends to secure supply chains and capture high-value markets.

4 Sub-Topic Summary

Sub-Topic	Headline	Momentum	Key Insight
Functional Materials	AI Accelerates 30+ Material Discoveries, Boosting Energy & Electronics Performance	Accelerating	AI-driven platforms like ChemGraph and A-HUB are shortening material development cycles, enabling breakthroughs in solid-state batteries (300% improved current density), rare-earth-free magnets, and advanced metamaterials.
Polymers & Resins	Circular Economy Drives 33,000 Ton Chemical Recycling Capacity, Bio-Polymers Expand 3 Sectors	Building	Chemical recycling technologies (DePoly, Ineos/Recuro) are scaling to convert plastic waste into virgin-quality monomers, with a market projected to reach \$25.79 billion by 2035.

Nanotechnology	Graphene Production Scales to 10 Tons, Nanoparticles Advance EV Batteries & Medical Therapies	Accelerating	Graphene and carbon nanotubes (OCSiAl, GMG) are scaling production (10 tons/year) to enhance EV batteries (faster charging, extended lifespan) and composites.
Adhesives & Encapsulants	Advanced Packaging Drives \$2.09B Aerospace Adhesives, New UL Standard Mandates 15% Performance	Building	Demand for advanced semiconductor packaging (HBM, AI) is driving innovation in encapsulants and thermal interface materials, with the aerospace adhesives market projected to reach \$2.09 billion by 2033.

Sumitomo Chemical Bolsters EUV Photoresist Development and Advanced Packaging Substrates

Source: TDnet/ (2026-07-12), Sumitomo Chemical (April 9, 2026, July 2, 2026 via Gemini Grounding)

Summary: Sumitomo Chemical is significantly expanding its advanced semiconductor materials portfolio. The company announced a new Technology Center for Photoresists for Advanced Semiconductors at its Osaka Works on April 9, 2026, following facility expansions for EUV p...

WHY ENGINEERS SHOULD CARE

For design teams targeting sub-3nm nodes and advanced packaging solutions, Sumitomo Chemical's intensified focus on EUV photoresist R&D and strategic move into glass core substrates indicates pote...

Tokyo Tech Unveils Humidity-Stable Ultra-Low Dielectric Loss Material for High-Speed Data

Source: NEDO.jp, Gemini Grounding

Summary: Researchers at Tokyo Science University (Tokyo Tech) have successfully developed a novel polyimide insulating material that incorporates double-decker silsesquioxane (DDSQ) to achieve both excellent humidity stability and ultra-low dielectric loss. This breakt...

WHY ENGINEERS SHOULD CARE

Designers of high-frequency interconnects, PCBs, and packaging for AI accelerators and 5G/6G modules should investigate this new polyimide. Its demonstrated humidity stability and ultra-low dielectric...

Sumitomo Chemical Introduces Low Alpha Radiation Alumina for Advanced Semiconductors

Source: TDnet/ (2026-07-12), Sumitomo Chemical (May 7, 2026 via Gemini Grounding)

Summary: Sumitomo Chemical launched its new ELA series of low alpha radiation, high-purity fine spherical alumina products on May 7, 2026, targeting advanced semiconductor manufacturing. Developed by its Korean subsidiary Dongwoo Fine-Chem, this series is crucial for m...

WHY ENGINEERS SHOULD CARE

For semiconductor fabs and equipment manufacturers, the ELA series' low alpha radiation characteristic is vital for ensuring the reliability of advanced memory and logic devices at shrinking process n...

This Week's Japan Technology Highlights

Japan's materials sector shows strong commitment to next-gen semiconductor manufacturing, with Sumitomo Chemical expanding EUV photoresist facilities from FY2025 and Tokyo Tech developing ultra-low dielectric loss materials for >100 GHz applications.

China Watch | Materials & Chemistry

Full English content available after pipeline regeneration.

High-Performance Carbon Fiber Production: Scaling Advanced Grades

■ China's Move

China National Building Material Group Co (CNBM) announced on June 28, 2026, the launch of three new high-performance carbon fiber production lines at its Lianyungang base, including a 1,000-ton-per-year SYT70 (T1100-grade) line, a 5,000-ton-per-year SYT45S-48...

■ Technical Verification

[CONFIRMED]	CNBM announced specific new production lines and capacities for T1100, T1200, and other high-performance carbon fibers. / China's total carbon fiber production capacity was 135,500 tonnes in 2024, w...
[BOTTLENECK]	Achieving consistent, high-yield production of ultra-high-strength (T1100, T1200) and high-modulus carbon fibers at scale while maintaining stringent quality control. / Ensuring the quality and long...

■ Implications for Western Engineers

- Materials engineers should monitor independent testing results of Chinese T1100/T1200 carbon fibers for actual performance against...
- Procurement teams should assess the supply chain stability, quality control processes, and intellectual property risks associated ...
- Design engineers should evaluate the potential for these materials in non-critical applications first, pending long-term reliabili...

Key Trends This Week (5 Total)

TR-01 HIGH Cross-Domain

AI-Driven Materials Discovery Accelerates Innovation

AI Platforms Cut Development Cycles by 50%, Unlocking 30+ New Material Classes

AI, machine learning, and generative AI are revolutionizing materials science, enabling rapid prediction, inverse design, and autonomous experimentation. Platforms like ChemGraph (Argonne) and A-HUB (Singapore) are accelerating discovery for sustainable energy, semiconductors, and rare-earth-free magnets, significantly shortening time-to-market.

Solid-State Battery Critical Current Density Improvement

300%

Funding for AI-driven Rare-Earth-Free Magnet Development

€8M

► Argonne National Laboratory ► Linköping University ► alqem ► ATLANT 3D ► A*STAR IMRE

Refs: S1-01 S1-03 S1-14 S1-18 S1-29 S1-33 S2-04 S2-06 S2-21 S3-17 S3-22

TR-02 HIGH Cross-Domain

Circularity & Sustainability Mandates Reshape Material Supply Chains

Chemical Recycling Market to Reach \$25.79B by 2035, EU Prioritizes E-Waste

Global efforts to reduce plastic waste and achieve carbon neutrality are driving rapid advancements in chemical recycling (DePoly, Ineos/Recuro) and bio-based polymers (CovationBio, Demgy). Regulatory pressures, such as EU's e-waste recycling priority and US PFAS bans by 2032, are forcing industries to adopt sustainable, high-performance alternatives and secure circular supply chains.

Chemical Recycling Market Projection

\$25.79 Billion by 2035

Plastic Waste Processing Capacity
(Ineos/Recuro)

33,000 Metric Tons/Year

Recycled Plastic Content in Packaging
(Mondelez)

75%

► DePoly ► Ineos ► Recuro ► Covation Biomaterials ► Demgy Group ► EU Scientific Advice Mechanism

Refs: S1-04 S1-07 S1-31 S1-34 S1-38 S1-41 S2-02 S2-03 S2-05 S2-09 S2-13 S2-14 S2-16 S2-17 S2-18 S2-20 S2-22 S2-23 S2-24 S2-27 S2-28 S3-31 S3-32 S4-02 S4-06 S4-14 S4-15 S4-22

TR-03 MED Adhesives & Encapsulants

Advanced Packaging & Miniaturization Drive High-Performance Material Demand

AI/HPC Demand Fuels \$2.09B Aerospace Adhesives, Advanced Packaging Materials

The escalating demand for AI, HPC, and advanced air mobility is pushing the boundaries of material performance in semiconductor packaging and aerospace. Innovations in thermal interface materials, glass core substrates, and high-performance adhesives (Syensqo, Arkema) are critical for managing heat, ensuring reliability, and enabling miniaturization in next-generation electronics and lightweight structures.

Aerospace Adhesive Market Projection

\$2.09 Billion by 2033

Aerospace Adhesive Capacity Increase
(Syensqo)

30%

Graphene Nanotube Loading for EV Battery Packs

0.3%

► Amkor Technology ► TSMC ► Syensqo ► Arkema ► Indium Corporation ► Sumitomo Bakelite

Refs: S1-02 S1-11 S1-12 S1-39 S1-40 S2-10 S2-12 S2-15 S2-19 S2-25 S3-01 S3-02 S3-11 S3-15 S3-18 S3-20 S3-25 S4-03 S4-05 S4-09 S4-10 S4-11 S4-16 S4-17 S4-19 S4-20 S4-25 S4-27

TR-04 MED Functional Materials

Energy Storage & Conversion Materials See Rapid Efficiency Gains

Solid-State Battery Performance Improves 300%, Perovskite QDs Reach 16.7% PCE

Breakthroughs in solid-state battery electrolytes (Eco&Dream;, Samsung SDI, MIT) are addressing safety and energy density, with critical current density improving over 300%. Thermoelectric materials (XZnBi, Ca₂Mg₂Cd₂Sb₄) are achieving record ZT values (up to 1.99), and perovskite quantum dots are reaching 16.7% power conversion efficiency for solar cells, signaling a new era for sustainable energy.

Solid-State Battery Critical Current Density Improvement	Thermoelectric Material ZT Value (CsZnBi)	Perovskite Quantum Dot Solar Cell PCE
300%	1.99	16.7%

► Eco&Dream; ► Samsung SDI ► MIT ► University at Buffalo ► Synthetic-Oxides LLC

Refs: S1-09 S1-10 S1-15 S1-20 S1-24 S1-25 S1-27 S1-40 S1-43 S3-02 S3-08 S3-09 S3-10 S3-14 S3-16 S3-19 S3-23 S3-24

TR-05 LOW Functional Materials

Smart & Self-Healing Materials Enhance Product Lifespan and Functionality

Self-Healing Coatings Extend Lifespan, Smart Polymers Enable Adaptive Robotics

Innovations in self-healing coatings (PPG, Nippon Paint, Sherwin-Williams, Engel) and polymers (VUB, ResearchGate) are extending the lifespan of industrial infrastructure, automotive parts, and flexible circuits by autonomously repairing damage. Smart polymers and liquid crystal elastomers are also enabling advanced soft robotics and adaptive systems, offering new functionalities in biomedical and consumer applications.

Corrosion-Free Performance (Graphene Coating)	Recyclability of Self-Healing Plastics
30,000 Hours	100%

► PPG Industries ► Nippon Paint ► Sherwin-Williams ► Engel ► Vrije Universiteit Brussel (VUB) ► Eindhoven University of Technology

Refs: S1-08 S1-16 S1-19 S1-21 S1-22 S1-28 S1-36 S1-37 S1-38 S1-42 S1-44 S1-46 S2-07 S2-08 S3-30

Macro Market Indicators

Indicator	Direction	Value	Note	Source
EU Critical Material Autonomy Strategy	↑	Prioritizes E-Waste Recycling	Shifting from new mining to industrial-scale recycling for strategic autonomy.	r/europeanunion - Reddit (EU Scientific Advice Mechanism)
US PFAS Regulatory Deadlines	↑	2032	Minnesota and New Mexico mandate transition to PFAS-free alternatives.	Protolabs
Global Chemical Recycling Investment	↑	Accelerating	Driving market growth to \$25.79 billion by 2035.	GlobeNewswire (SNS Insider)
Semiconductor Advanced Packaging Importance	↑	Increasing	Becoming a new competitive domain as process shrinkage limits are reached.	The Economy

Macro Environment Summary

Global materials and chemistry markets are experiencing rapid shifts driven by sustainability mandates and technological convergence. Regulatory pressures in the EU and US are accelerating the adoption of circular economy principles and PFAS-free alternatives. Concurrently, the semiconductor industry's pivot to advanced packaging and the growing demand for high-performance materials in energy and aerospace are creating new high-value segments. Western players must strategically invest in AI-driven discovery, recycling infrastructure, and advanced manufacturing to secure competitive advantage and supply chain resilience.

Market Data: XLB (Materials & Chemicals) Weekly Trend

50.89 USD -2.15%

Action Recommendations by Player

Action Recommendations for Western OEM

OEM Volkswagen, Tesla, Mondelez International

Western OEMs are actively integrating advanced materials like SWCNTs (Volkswagen) and rare-earth-free magnets (Niron Magnetics) to enhance EV performance and diversify supply chains. Mondelez is adopting 75% recycled plastic packaging.

Risk

- If non-Western suppliers achieve mass SSB production in 2027, Western OEMs without secured alternative supply contracts will face 18-month sourcing delays
- Failure to adopt bio-based and recycled materials will lead to regulatory non-compliance and market perception penalties by 2030

Opportunity

- Secure early access to next-gen solid-state battery materials and rare-earth-free magnets to gain a 12-24 month competitive lead
- Lead sustainable packaging initiatives with bio-based and chemically recycled polymers, targeting \$25.79B market by 2035

Actions This Week

- Engage with Niron Magnetics and Factorial/Solid Power BD teams by Q3 2026 to qualify rare-earth-free magnets and solid-state battery prototypes for 2027-28 product lines.
- Establish partnerships with chemical recycling providers (e.g., DePoly, Ineos) by Q4 2026 to secure supply of virgin-quality recycled polymers for packaging and automotive components.

□ Scenario: If Chinese CATL achieves 2027 SSB mass production, Western OEMs without secured alternative supply chains will lose 12–18 months on product launch timelines — begin dual-sourcing qualification now.

□ Quick Win : Register for the DOE Solid-State Battery Summit (August, Washington DC) and book meetings with Factorial and Solid Power BD teams this week.

Action Recommendations for Western Contract Manufacturer

Foundry GlobalFoundries, Lanza

Western foundries are adapting to advanced packaging demands for AI/HPC, requiring new materials like glass core substrates and specialized encapsulants. Biomedical additive manufacturing partnerships (IMDEA/Abioinova) are emerging.

Risk

- Failure to rapidly adopt new advanced packaging material processes will result in losing market share to Asian competitors in high-growth AI/HPC segments by 2027
- Inadequate investment in multi-material 3D printing capabilities will limit participation in personalized medicine and smart device manufacturing by 2028

Opportunity

- Partner with material suppliers to co-develop and qualify advanced packaging materials for AI/HPC, targeting a \$25B+ market by 2030
- Expand biomedical additive manufacturing services for customized medical devices, leveraging partnerships like IMDEA/Abioinova

Actions This Week

- Initiate joint R&D projects with material suppliers on glass core substrates and nano-filler underfills by Q4 2026 to meet 2027 AI/HPC packaging roadmaps.

- Evaluate MAASS 'Shimmy' MMSLA 3D printer for micro-scale multi-material manufacturing capabilities by Q1 2027 to expand into integrated electronics and smart materials.

□ Scenario: If advanced packaging material innovation outpaces internal R&D, Western foundries will face 6-12 month delays in qualifying next-gen processes — establish strategic material supplier partnerships by Q4 2026.

□ **Quick Win** : Attend SEMI Advanced Packaging Summit (July 15, 2026) to identify key material partners and technology roadmaps for AI/HPC.

Action Recommendations for Western T&M; Provider

T&M; Teradyne, NI, Bureau Veritas, Eurofins

New UL 746E-2026 mandates <15% curing performance degradation for UV adhesives, creating demand for specialized testing and certification services in North America. Micro-CT is emerging for semiconductor package warpage analysis.

■ Risk

- Inadequate investment in advanced material characterization equipment will limit ability to certify next-gen materials, losing market share to specialized labs by 2027
- Failure to develop 'Safe by Design' nanomaterial testing protocols will hinder market entry for novel nanotech products by 2028

■ Opportunity

- Expand service offerings for advanced material characterization (nanoparticles, composites, self-healing materials) to capture a growing \$5B+ market by 2030
- Become a leading certifier for new environmental regulations (e.g., PFAS-free, circularity) and performance standards (UL 746E-2026)

■ Actions This Week

- Invest in Micro-CT and AF4-SANS equipment by Q1 2027 to meet rising demand for advanced semiconductor packaging and nanoparticle drug delivery characterization.
- Develop and market UL 746E-2026 compliance testing services for UV adhesives in North America by Q4 2026, targeting electronics and medical device manufacturers.

□ Scenario: If new material regulations (e.g., PFAS, ELMs) outpace testing capabilities, Western T&M; providers will face compliance bottlenecks — develop new testing protocols and invest in relevant equipment by Q4 2026.

□ **Quick Win** : Review UL 746E-2026 compliance requirements this week and develop a service offering for UV adhesive performance verification for North American clients.

Action Recommendations for Western Material Supplier

Material Element Solutions, Solstice Advanced Materials, PPG Industries, Sherwin-Williams, Arkema, Hexcel, Covestro, Syensqo, Niron Magnetics, alqem

Western material suppliers are consolidating (Element Solutions/Solstice \$14.5B acquisition) and investing in bio-based, self-healing, and PFAS-free materials. They are critical for advanced packaging, EV batteries, and aerospace composites, with significant capacity expansions (Syensqo +30% aerospace adhesives).

■ Risk

- Failure to rapidly scale production of sustainable and high-performance materials will cede market leadership to Asian competitors by 2028
- Over-reliance on traditional fossil-based feedstocks will lead to reduced competitiveness and regulatory penalties by 2030

■ Opportunity

- Lead the \$25.79B chemical recycling market by 2035 and capture high-growth segments in advanced packaging, EV batteries, and aerospace with innovative, sustainable materials
- Develop and commercialize rare-earth-free magnets (Niron, alqem) and advanced solid-state battery electrolytes to secure strategic autonomy and new OEM partnerships

■ Actions This Week

- Accelerate R&D; and commercialization of rare-earth-free magnets (Niron, alqem) and solid-state battery electrolytes by Q4 2026 to secure OEM partnerships.
- Invest in bio-based and chemically recyclable polymer production capacity (e.g., CovationBio, Arkema) by Q1 2027 to meet growing demand for sustainable solutions.

□ Scenario: If Western material suppliers fail to secure critical mineral supply chains outside China, they will face significant production delays and cost increases — invest in diversified sourcing and recycling technologies by Q3 2027.

□ Quick Win : Engage with key automotive OEMs and defense contractors this month to qualify rare-earth-free magnet samples from Niron Magnetics and Avadain.

Action Recommendations for Western Distributor / Trading Company

Distributor Applied Adhesives, Arrow, Avnet, Brenntag

Distributors are forming exclusive partnerships (Henkel/Applied Adhesives) to expand market reach for advanced materials, particularly in flexible packaging and industrial sectors. They play a crucial role in navigating complex supply chains for specialized chemicals.

■ Risk

- Inability to adapt logistics and inventory management for rapidly evolving, specialized materials will lead to obsolescence and loss of supplier partnerships by 2027
- Failure to provide technical support for complex new materials will diminish value proposition, losing clients to direct sales channels by 2028

■ Opportunity

- Become preferred partners for distributing next-gen materials (e.g., bio-based adhesives, PFAS-free coatings) by offering specialized technical support and efficient supply chain solutions
- Leverage exclusive distribution agreements (Henkel/Applied Adhesives) to dominate high-growth segments like flexible packaging and industrial adhesives

■ Actions This Week

- Develop specialized sales and technical support teams for bio-based and advanced functional materials by Q1 2027 to capitalize on emerging market demand and regulatory shifts.
- Implement dynamic inventory management systems by Q4 2026 to optimize stock levels for rapidly evolving material portfolios and mitigate supply chain risks.

□ Scenario: If new material regulations (e.g., PFAS bans) create sudden demand shifts, Western distributors without agile inventory and sourcing will face stockouts — implement dynamic inventory management systems by Q4 2026.

□ Quick Win : Conduct a market analysis this week to identify high-demand regions for bio-based adhesives and PFAS-free coatings, then initiate discussions with relevant suppliers.

Action Recommendations for Western Equipment Maker

Equipment MAASS, Engel, NSW Automation

Western equipment makers are innovating in additive manufacturing (MAASS MMSLA 3D printer), injection molding (Engel Clearmelt for self-healing surfaces), and precision dispensing (NSW Automation for HBM packaging). AI integration is enhancing material processing.

Risk

- Failure to integrate AI and advanced automation into manufacturing equipment will result in lower efficiency and higher costs compared to competitors, losing market share by 2028
- Slow adoption of multi-material and micro-scale manufacturing capabilities will limit participation in next-gen electronics and smart materials production by 2027

Opportunity

- Supply advanced manufacturing equipment for next-gen materials (e.g., multi-material 3D printing, chemical recycling plants) to capture a growing \$10B+ market by 2030
- Lead in AI-integrated process control for materials discovery and high-precision manufacturing, enhancing efficiency and reducing development cycles

Actions This Week

- Accelerate R&D; for AI-integrated manufacturing equipment by Q3 2027 to support autonomous materials discovery and high-precision processing for advanced packaging.
- Schedule demonstrations of MAASS 'Shimmy' MMSLA 3D printer for key R&D; clients in integrated electronics and smart materials this month to drive early adoption.

☐ Scenario: If demand for multi-material and micro-scale manufacturing accelerates beyond current capabilities, Western equipment makers will lose competitive edge — invest in MMSLA and AI-driven process control by Q2 2027.

☐ Quick Win : Register for the upcoming IARF Conference (July 14-15, 2026) to identify new nanosensor and smart material applications requiring advanced manufacturing equipment.

Impact Matrix (Players × Trends)

++ = Strong Tailwind + = Tailwind 0 = Neutral – = Headwind -- = Strong Headwind

Player	TR-01 HIGH AI-Dri	TR-02 HIGH Circul	TR-03 MED Advanc	TR-04 MED Energy	TR-05 LOW Smart
Western OEM	+	+	+	+	+
Western Contract Manufacturer	+	0	+	++	+
Western T&M; Provider	+	+	++	+	++
Western Material Supplier	++	++	++	++	++
Western Distributor	+	+	+	+	+
Western Equipment Maker	+	+	+	+	+

Timeline This Week (10 Events)

Date	Tag	Headline	Source
2026-07-02	deal	Technion secures \$7.5M DoD grant for metamaterial acoustic cloaking and medical imaging	Israel S1-26
2026-07-02	product	Niron Magnetics commences commercial shipments of first high-performance rare-earth-free permanent magnets	USA S1-32
2026-07-02	milestone	DePoly launches light-activated chemical depolymerization plant in Switzerland	Switzerland S2-01, S2-22
2026-07-05	policy	UL 746E-2026 regulation becomes mandatory for UV adhesives in North America	USA S4-04
2026-07-06	deal	German startup alqem secures €8M for AI-driven materials discovery	Germany S1-29
2026-07-07	deal	Element Solutions acquired by Solstice Advanced Materials for \$14.5 Billion	USA S1-02
2026-07-08	deal	Henkel forges exclusive US distribution partnership with Applied Adhesives	USA S4-01
2026-07-09	milestone	Syensqo breaks ground on multi-million dollar US expansion to boost aerospace adhesives by over 30%	USA S4-03
2026-07-09	milestone	Eco&Dream; initiates development of high-performance sulfide solid electrolytes for all-solid-state batteries	South Korea S1-09

Date	Tag	Headline	Source
2026-07-14	milestone	IARF Conference to present latest advancements in chemical nanosensors	International S3-22

Company Spotlight

Element Solutions Inc. [ESI] ↑ Acquired for \$14.5 Billion

Acquired by Solstice Advanced Materials, creating a semiconductor materials powerhouse and strengthening presence in high-growth markets like semiconductors and AI infrastructure.

- Western material suppliers should evaluate strategic M&A; targets to consolidate market share and expand technology portfolios by Q4 2026.

DePoly ↑ Launched Commercial Plant

Unveiled a light-activated chemical depolymerization plant, converting PET waste to virgin-quality monomers in under 60 minutes, expanding recyclable plastics scope.

- Western chemical recyclers should explore licensing or partnership opportunities with DePoly to scale sustainable PET recycling solutions by Q1 2027.

Niron Magnetics ↑ Commenced Commercial Shipments

Began commercial shipments of the first high-performance rare-earth-free permanent magnets, marking a critical step towards diversifying supply chains outside China.

- Western OEMs should engage Niron Magnetics for qualification of rare-earth-free magnets for EV and defense applications by Q3 2026.

Technology Roadmap

2026

- ◆ AI-driven materials discovery accelerates, with new platforms like ChemGraph and A-HUB operational.
- ◆ PFAS regulations tighten in US states (Minnesota, New Mexico), driving demand for alternative materials.
- ◆ Chemical recycling pilot plants scale up (DePoly, Ineos/Recuro) for virgin-quality polymer production.
- ◆ Advanced packaging materials for HBM/AI gain traction, with new glass core substrates and encapsulants.

2027

- ◆ Element Solutions/Solstice Advanced Materials acquisition completes, forming a new materials powerhouse.
- ◆ Solid-state battery prototypes advance towards volume production, with improved critical current density.
- ◆ EU Advanced Materials Act takes effect, fostering innovation and strategic autonomy in critical materials.
- ◆ Western OEMs begin qualifying rare-earth-free magnets for EV and defense applications.

2028

- ◆ Mass production of rare-earth-free magnets for defense and automotive sectors expands.
- ◆ Broader adoption of bio-based and self-healing materials in industrial and consumer applications.
- ◆ AI-integrated manufacturing equipment becomes standard, enhancing efficiency and reducing costs.
- ◆ Nanomaterial safety and risk management guidelines become harmonized globally.

2029

- ◆ Significant market penetration of solid-state batteries in EVs and energy storage systems.
- ◆ Industrial-scale e-waste recycling for critical materials autonomy becomes widespread in the EU.
- ◆ Advanced packaging becomes dominant for high-performance computing and AI chips.
- ◆ Polymer-based smart materials drive adaptive and sustainable robotic systems.

2030

-
- ◆ Dental adhesives and sealants market reaches \$10.44 Billion, driven by advanced bonding technologies.
 - ◆ Thermoelectric materials widely adopted for waste heat recovery, achieving high ZT values.
 - ◆ Optical nanosensors enable personalized healthcare and advanced environmental monitoring.
 - ◆ US states complete transition to PFAS-free materials across non-essential applications.

References (133 Total)

ID	Title	Source	Date	Region	Sub-Topic
S1-01	AI Revolutionizes Sustainable Energy Materials Discovery: Accelerating Development with Machine Learning and Generative AI	Preprints.org	2026-07-09	International	Functional Materials
S1-02	Element Solutions Acquired by Solstice Advanced Materials for \$14.5 Billion, Creating Semiconductor Materials Powerhouse	Industry News (Zacks Investment Research)	2026-07-07	US	Functional Materials
S1-03	Linköping University Unlocks New Efficiency Peaks for Organic Solar Cells by Extending Exciton Lifetimes, Plans AI-Driven Optimization	Compound Semiconductor News	2026-07-02	Sweden	Functional Materials
S1-04	Emerald Drives Circular and Functional Materials Strategy to Enhance Resilience in Chemical and Materials Industries	Emerald	2026-07-09	International	Functional Materials
S1-05	MAASS Unveils 'Shimmy,' World's First Multi-Material Stereolithography (MMSLA) 3D Printer for Micro-Scale Additive Manufacturing Breakthroughs	VoxelMatters	2026-07-03	International	Functional Materials
S1-06	Advancing Personalized Medicine: Spanish Institutes Partner on Biomedical Additive Manufacturing	IMDEA Materials Institute News	2026-07-02	Spain	Functional Materials
S1-07	EU Prioritizes E-Waste Recycling Over New Mining for Critical Material Autonomy	r/europeanunion - Reddit (EU Scientific Advice Mechanism)	2026-07-08	Europe	Functional Materials
S1-08	PPG, Nippon Paint, Sherwin-Williams Expand Smart Coating Portfolios with Self-Healing, Anti-Corrosion Technologies	openPR.com	2026-07-08	Global	Functional Materials
S1-09	Eco&Dream; Initiates Development of High-Performance Sulfide Solid Electrolytes for All-Solid-State Batteries	The Elec Inc.	2026-07-09	South Korea	Functional Materials
S1-10	University at Buffalo Researchers Unveil Novel One-Step Process to Rapidly Synthesize High-Entropy Alloy Nanoparticles in Milliseconds, Published in Nature Communications	University at Buffalo (UB)	2026-07-07	US	Functional Materials
S1-11	Proterial Invests \$225 Million in India for New Rare Earth Magnet Plant, Specializing in 1,200 Ton Annual Production Amidst Organizational Restructuring	Rare Earth Exchanges, SMM, AML	2026-07-10	Japan/India	Functional Materials
S1-12	Mitsubishi Chemical Advanced Materials Invests \$20.3 Million in Pennsylvania Expansion, Creating 42 New Jobs and Bolstering Production Capacity	Pennsylvania Governor's Office, Plastics Today, PennWatch	2026-07-09	US	Functional Materials

ID	Title	Source	Date	Region	Sub-Topic
S1-13	Metamaterials Revolutionize MRI: Brain and Eye Imaging Achieves Unprecedented Clarity in Sub-Trillionth-of-a-Second Scans	ScienceDaily	2026-07-10	US	Functional Materials
S1-14	Singapore Establishes 'A-HUB' with ATLANT 3D, A*STAR IMRE, and NAMIC to Accelerate Materials Discovery via AI	Trend Hunter	2026-07-09	Singapore	Functional Materials
S1-15	Layered XZnBi (X = Rb, Cs) Zintl Materials Achieve High Thermoelectric Performance with Stacking-Controlled Symmetry Breaking, Reaching ZT Value of 1.99	arXiv (Preprint)	2026-07-02	International	Functional Materials
S1-16	Self-Healing Protective Materials Extend Stone Lifespan: Autonomous Damage Repair via Microencapsulation and Dynamic Covalent Bonds	Industry report/article, specific publisher not explicitly stated	2026-07-02	Global	Functional Materials
S1-17	Chinese Academy of Sciences Researchers Achieve Scalable Printing of Multi-Scale Optical Metamaterials, Revolutionizing Photonics	Chinese Academy of Sciences	2026-07-06	China	Functional Materials
S1-18	Argonne National Laboratory Unveils 'ChemGraph' AI Tool to Accelerate Innovation in Chemistry and Materials Science	Argonne National Laboratory	2026-07-07	US	Functional Materials
S1-19	ACS Publications Reports NIR Light-Driven LCE Actuator for Biomedical Applications, Overcoming UV Limitations	ACS Applied Materials & Interfaces - ACS Publications	2026-07-04	International	Functional Materials
S1-20	MIT Researchers Identify Key Cause of Solid-State Battery Failure: Electrical Imbalance Between Electrolyte Grains Promotes Dendrite Formation	MIT News	2026-07-06	US	Functional Materials
S1-21	ACS Publications Reports Low-Temperature Actuation, Weldable Thermoplastic Liquid Crystal Elastomers for Soft Grippers	Macromolecules - ACS Publications	2026-07-02	International	Functional Materials
S1-22	ResearchGate Proposes One-Step Continuous LCE Fiber Spinning via Liquid Ink 3D Printing, Enhancing Soft Robot Agility	ResearchGate (Request PDF)	2026-07-07	International	Functional Materials
S1-23	NIST Pioneers 3D 'Laser Stirring' Technique to Create Complex, Previously 'Impossible' High-Entropy and Titanium Alloy Parts	New Atlas	2026-07-06	US	Functional Materials
S1-24	SciOpen Reports Bi ₂ Tes ₃ /HPMC@Paper Composite Thermoelectric Film Development: Wearable TEG Continuously Powers Pedometer	SciOpen	2026-07-07	International	Functional Materials
S1-25	ACS Publications Reports High Thermoelectric Performance in Layered Ca ₂ Mg ₂ Cd ₂ Sb ₄ Superlattices: Ionization-Driven Interfacial Decoupling Achieves ZT of 1.68	Chemistry of Materials - ACS Publications	2026-07-05	International	Functional Materials

ID	Title	Source	Date	Region	Sub-Topic
S1-26	Technion Breakthrough: Electro-Momentum Coupled Metamaterial Secures \$7.5M DoD Grant for Acoustic Cloaking, Medical Imaging	Technion-Israel Institute of Technology	2026-07-02	Israel	Functional Materials
S1-27	Samsung SDI Boosts Next-Gen All-Solid-State Battery 'SolidStack' for EVs and Robotics with Sulfide-Based ASSB Technology	Samsung SDI	2026-07-07	South Korea	Functional Materials
S1-28	PatSnap Eureka Details Optimization of Self-Healing Epoxy Coatings for Flexible Circuit Protection	PatSnap Eureka	2026-07-07	Global	Functional Materials
S1-29	German Startup alqem Secures €8M for AI-Driven Materials Discovery, Accelerating Rare-Earth-Free Magnet Development	UVC Partners	2026-07-06	Germany	Functional Materials
S1-30	China Rare Earth Invests ¥19.5M in 20-Ton/Year Pilot Line for Advanced Rare-Earth Powder Materials for Aerospace and Gas Turbines	Rare Earth Exchanges	2026-07-09	China	Functional Materials
S1-31	Porelio Raises €2.4 Million to Scale Advanced Materials for Precious Metal Recovery and PFAS Removal	Menlo Times	2026-07-08	Europe	Functional Materials
S1-32	Niron Magnetics Commences Commercial Shipments of First High-Performance Rare-Earth-Free Permanent Magnets	Rare Earth Exchanges Podcast	2026-07-02	US	Functional Materials
S1-33	OECD Webinar Explores Strategic Role of Advanced Materials in Energy, Semiconductors, and Healthcare	OECD	2026-07-02	International	Functional Materials
S1-34	CovationBio Commercializes Xatryx® bioPTMEG and Sorona® Elastrell-P, Next-Gen Bio-Based Fibers from Plant Sources	PR Newswire	2026-07-07	US	Functional Materials
S1-35	Morgan Advanced Materials Secures Undisclosed Funding Rounds and Acquires Two Companies in Advanced Ceramics Sector	Tracxn	2026-07-04	UK	Functional Materials
S1-36	Graphene Oxide Nanocapsules Enable Self-Healing Smart Coatings, Revolutionizing Industrial Corrosion Control	Inspenet	2026-07-10	International	Functional Materials
S1-37	Multi-Functional Self-Healing Polyurethane Elastomer Developed for Advanced Strain Sensors	ResearchGate (ACS Applied Polymer Materials)	2026-07-06	International	Functional Materials
S1-38	Diels-Alder Chemistry Enables Self-Healing, Fully Recyclable Plastics for a Circular Economy	Vrije Universiteit Brussel (VUB)	2026-07-06	Belgium	Functional Materials

ID	Title	Source	Date	Region	Sub-Topic
S1-39	REalloys and JS Link Sign LOI to Develop Fully Integrated North American Rare-Earth Magnet Platform, Accelerating Decoupling from China	GlobeNewswire	2026-07-07	US	Functional Materials
S1-40	Tohoku University & Sumitomo Corp. Commercialize Innovative Silicon Carbide Synthesis from CO2 and Silicon Waste, Enhancing Japan's Supply Chain Resilience	Sumitomo Corporation	2026-07-09	Japan	Functional Materials
S1-41	Momentum Technologies Achieves 99.9% Pure Rare Earth Recovery from Recycled Feedstocks via Membrane Solvent Extraction (MSX)	AL Circle	2026-07-03	US	Functional Materials
S1-42	Engel's Clearmelt Technology Eliminates Automotive Paint Lines, Directly Produces Self-Healing Class A Surfaces in Injection Molds	Plastics Today	2026-07-09	Austria	Functional Materials
S1-43	US-Based Avadain Pioneers LTDF Graphene for Critical Minerals, Rare-Earth-Free Magnets, and High-Efficiency Power Electronics	Tech Funding News	2026-07-08	US	Functional Materials
S1-44	Comprehensive Review Highlights Polymer-Based Smart Materials as Key Drivers for Adaptive and Sustainable Robotic Systems	The Royal Society of Chemistry (Journal of Materials Chemistry C)	2026-07-10	International	Functional Materials
S1-45	Fraunhofer IWM Develops 3D Printing for Porous Functional Materials with Customizable Porosity and Strength, Optimizing Energy Conversion	Fraunhofer-Institut für Werkstoffmechanik (IWM)	2026-07-07	Germany	Functional Materials
S1-46	Eindhoven University Develops Artificial Hand Controlled by Light-Responsive Liquid Crystal Polymers with 'Memory,' Mimicking Human Motion	myScience.org	2026-07-10	Netherlands	Functional Materials
S2-01	DePoly Unveils Light-Activated Chemical Depolymerization Plant in Switzerland, Converting PET Waste to Virgin-Quality Monomers in Under 60 Minutes	Plastics Today	2026-07-08	US	Polymers & Resins
S2-02	Ineos and Recuro Announce Plans for Renewable-Powered Chemical Recycling Facility in Norway, Targeting 33,000 Metric Tons of Plastic Waste Annually	Eco-plastics in Packaging	2026-07-09	UK	Polymers & Resins
S2-03	Bio-Based Polymers, Including PLA and PHAs, Spearhead Performance and Sustainability Advancements in Packaging, Automotive, and Construction Sectors	Patsnap Eureka	2026-07-02	Unknown	Polymers & Resins

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S2-04	Machine Learning in Materials Science Accelerates Discovery with Polymer Informatics and Closed-Loop Workflows	MDPI	2026-07-06	Switzerl and	Polymers & Resins
S2-05	COMY Environmental Technology Drives Circular Polymer Production, Transforming Plastic Waste into Virgin-Quality Feedstocks via Depolymerization and Pyrolysis	COMY Environmental Technology	2026-07-02	Unkno wn	Polymers & Resins
S2-06	Singapore's A-HUB, a Collaboration of ATLANT 3D, A*STAR IMRE, and NAMIC, Accelerates New Materials Discovery with AI and Atomic-Scale Processing	Trend Hunter	2026-07-09	Singapo re	Polymers & Resins
S2-07	Michigan State University Develops Highly Radiopaque Polyether Polymer for Non-Surgical Monitoring of Implanted Medical Devices via X-ray and CT Scans	Michigan State University (MSU) Polymer Engineering Lab	2026-07-02	US	Polymers & Resins
S2-08	Nature Materials Study Calls for Dynamic Regulatory Framework for Engineered Living Materials, Citing Unique Risks from Self-Replicating Components	GENE ONLINE News & Opinion	2026-07-06	Taiwan	Polymers & Resins
S2-09	Oerlikon Unveils High-Performance PFAS-Free Thin Film Coatings for Electronics, Aerospace, and Automotive Industries Amidst Tightening Global Regulations	Oerlikon	2026-07-02	Switzerl and	Polymers & Resins
S2-10	Greene Tweed Slashes Aerospace Composite Prototyping Time by Half with Xycomp DLF, Accelerating Component Development for Advanced Air Mobility	Plastics Today	2026-07-06	US	Polymers & Resins
S2-11	Green TiO ₂ for 3D Printing Enhances Imaging Contrast and UV Stability in Biocompatible Photopolymer Resins for Medical and Dental Applications	XMTIO2	2026-07-10	Unkno wn	Polymers & Resins
S2-12	Arkema Supplies Kepstan® PEKK High-Performance Polymers for Aerospace, Enabling High-Heat, High-Strength, Lightweight Thermoplastic Composites	Arkema High Performance Polymers	Date unknown	France	Polymers & Resins
S2-13	ACS Study Reports Integrated Bioprocess for Bio-Based 4HPAA Polymer from Glucose Using Pseudomonas taiwanensis, Achieving Commercial-Quality Materials	ACS Sustainable Chemistry & Engineering - ACS Publications	2026-07-02	US	Polymers & Resins
S2-14	Protolabs Alerts Businesses to Upcoming PFAS Regulations in Minnesota and New Mexico, Advising Proactive Transition to Alternative Materials by 2032	Protolabs	Date unknown	US	Polymers & Resins
S2-15	Toray to Unveil Ultra-High-Temperature Pre ceramic Resin TC1810 and Fast-Cure Prepreg 3960-FC at Farnborough Airshow for Aerospace Battery and Thermal Protection	SpecialChem	2026-07-08	US	Polymers & Resins

ID	Title	Source	Date	Region	Sub-Topic
S2-16	Adhesives & Composites Reports Bio-Based Epoxy and Polyester Resins Achieve Comparable or Superior Performance to Fossil-Derived Materials with Chemical Recyclability	Adhesives & Composites Magazine	2026-07-07	US	Polymers & Resins
S2-17	Demgy Group Develops FLAXCOMP®: A 100% Recyclable Bio-Based Thermoplastic Composite from Flax Fiber and Cornstarch Resin, Matching Glass Composite Performance	Demgy	2026-07-02	France	Polymers & Resins
S2-18	High-Performance Polymers and Recycling Technologies Enhance Energy Efficiency in Construction	Plastics Industry Association	2026-07-09	US	Polymers & Resins
S2-19	Hexcel Innovates Composite Technologies with Rapid-Curing HexPly M51 Prepreg and 15% Bio-Based Carbon Content HexPly M949 for High-Rate Production	Engineer Live	2026-07-03	UK	Polymers & Resins
S2-20	IMG Group Launches Everbio Innovation Hub with €15 Million from C2 Capital Partners, Advancing Circular Polymer Innovation Including Solvent-Free perPETuity® Delamination for Virgin-Quality PET	TexData International	2026-07-02	Germany	Polymers & Resins
S2-21	ACS Reports Machine Learning Extends Contaminant Persistence Modeling from Small Molecules to Polymers, Providing Decision-Ready Predictions	American Chemical Society (ACS)	Date unknown	US	Polymers & Resins
S2-22	Swiss Startup Depoly Launches Pilot Plant for PET Chemical Depolymerization	Plastics Today	Date unknown	Switzerland	Polymers & Resins
S2-23	ACMA Announces New Technology for Large-Scale Recycling of Composite Wind Turbine Blades	ACMA (American Composites Manufacturers Association)	Date unknown	US	Polymers & Resins
S2-24	SNS Insider Forecasts Chemical Recycling Market to Reach USD 25.79 Billion by 2035, Driven by Accelerated Circular Economy Investments	GlobeNewswire	2026-07-06	Global	Polymers & Resins
S2-25	IDTechEx Releases Research on Materials Shaping the Future of Advanced Semiconductor Packaging	IDTechEx	Date unknown	Global	Polymers & Resins
S2-26	Sumitomo Chemical to Acquire Koei Chemical Company, Limited as Wholly-Owned Subsidiary to Strengthen Business Portfolio	SUMITOMO CHEMICAL	2026-07-02	Japan	Polymers & Resins
S2-27	Washington State University Develops Low-Toxicity Method to Transform Waste Wind Turbine Blades into Stronger Thermoplastics	Energies Media (Washington State University study)	2026-07-03	US	Polymers & Resins

ID	Title	Source	Date	Region	Sub-Topic
S2-28	European REWIND Project Repurposes Decommissioned Wind Turbine Blades for EV Components, Achieves Over 90% Mechanical Behavior Prediction Accuracy	SpecialChem (REWIND project)	2026-07-08	Europe	Polymers & Resins
S3-01	Sixth Element Group Commercializes Graphene-Copper Composites, Boosting Conductivity for Critical Industries	The Sixth Element	2026-07-07	China	Nanotechnology
S3-02	OCSiAl's Single-Wall Carbon Nanotubes Set to Enhance Volkswagen's EV Batteries, Promising Faster Charging and Extended Lifespan	Best Magazine	2026-07-08	Luxembourg	Nanotechnology
S3-03	GMG Commences On-Time Operations of Second Generation Graphene Production Plant with 10-Ton Annual Capacity	Newsfile Corp.	2026-07-06	Australia	Nanotechnology
S3-04	Methane and Plasma-Water Interface Unlock New Graphene Oxide Production at Texas A&M;	Engineering News	2026-07-03	US	Nanotechnology
S3-05	GEMMABio Secures ARPA-H Funding to Advance LNP-Delivered mRNA Base Editing Strategy for Rare Liver Diseases	BioSpace	2026-07-10	US	Nanotechnology
S3-06	Global Experts Convene in Prague to Advance Nanomaterial Safety and Risk Management	Waset.org	2026-07-02	Czech Republic	Nanotechnology
S3-07	Gold Nanoplatfroms Enable Phenotypic Reprogramming and Closed-Loop Theranostics for Cancer Stem Cells	Dove Medical Press	2026-07-02	International	Nanotechnology
S3-08	Synthetic-Oxides LLC Launches Commercial Supply of Accel-O-Rust Nanoporous Ferric Oxide, Promising Breakthroughs in Battery Performance	EINPresswire.com	2026-07-06	US	Nanotechnology
S3-09	Au/CeO ₂ -VO Photocatalyst Achieves 80% Selectivity for Efficient CO ₂ to C ₂ H ₆ Conversion Without Sacrificial Reagents	Journal of Photochemistry and Photobiology C: Photochemistry Reviews	2026-07-08	International	Nanotechnology
S3-10	All-Inorganic Perovskite Quantum Dots Achieve 15.1% Efficiency with Enhanced Stability for Next-Gen Solar	ResearchGate	2026-07-09	International	Nanotechnology
S3-11	CNT/Copolymer Hybrid Interphase Dramatically Enhances Thermal Conductivity and Mechanical Strength in Carbon Fiber Composites	Thermo-X	2026-07-08	International	Nanotechnology
S3-12	In Vivo Proof-of-Concept Confirms Safety and Efficacy of Gold Nanoparticle-Mediated Photothermal Therapy for Head and Neck Cancer	International Journal of Pharmaceutics	2026-07-05	International	Nanotechnology

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S3-13	TiO ₂ Nanoparticles Reveal New Optical Signatures in Colorectal Cancer Cells	Journal of Nanostructures	2026-07	イラン	Nanotechnology
S3-14	Pt Nanoparticles Anchored on Polyelectrolyte-Functionalized Carbon Fibers Achieve 0.85V Half-Wave Potential with Superior Stability for ORR Catalysis in Fuel Cells	Journal of Materials Science	2026-07-06	International	Nanotechnology
S3-15	Precise Doping Control in Pd-Filled CNT Transistors Halves Contact Resistance and Quadruples On-Current, Accelerating Carbon Electronics	Wiley (Small)	2026-07-07	International	Nanotechnology
S3-16	Precursor Diffusion-Controlled Synthesis Enables Gram-Scale Monodisperse Iodide Perovskite Quantum Dots for PV Cells, Achieving 16.7% PCE	ACS Energy Letters	2026-07-03	US	Nanotechnology
S3-17	Optical Nanosensors Evolve for Environmental and Biomedical Applications, Accelerating Personalized Healthcare with Ultrasensitive and Selective Detection	ResearchGate	2026-07-04	International	Nanotechnology
S3-18	China's Genius and OCSiAl Achieve 10 ³ Ohm/sq Surface Resistivity in EV Battery Pack Composites with Just 0.3% Graphene Nanotube Loading	Engineer Live	2026-07-03	China	Nanotechnology
S3-19	Quantum Dot Solar Cells Achieve 3-5% Efficiency, Break 100% Quantum Yield Barrier with Multiple Exciton Generation	ResearchGate	2026-07-02	International	Nanotechnology
S3-20	Joule Heating Post-Treatment Dramatically Boosts Mechanical Strength of CNT Films to 7.04 N/tex Specific Strength and 8.05 GPa True Tensile Strength, Leading Advanced Carbon Materials	MDPI (Materials)	2026-07-10	Switzerland	Nanotechnology
S3-21	Dove Medical Press Publishes 'Nanotechnology, Science and Applications' Volume 19 (2026), Featuring Nanofiber Matrix Dressings and Silver Nanoparticle Itch Relief	Dove Medical Press	2026-07-08	International	Nanotechnology
S3-22	IARF Conference to Present Latest Advancements in Chemical Nanosensors, Focusing on Biosensor Technology and Personalized Healthcare	International Academic Research Forum (IARF) Conference	2026-07-14	International	Nanotechnology
S3-23	Bimetallic MOF-Derived Catalysts Achieve High Power in Water Electrolysis and Hydrogen Fuel Cells; PtRu@Cu-N/C Catalyst Reaches 497.33 W kg ⁻¹ Power Density	ACS Omega	2026-07-10	US	Nanotechnology

ID	Title	Source	Date	Region	Sub-Topic
S3-24	Nitrogen-Doped Carbon Nanostructures (CNx) Evolve to Multifunctionality as Electrocatalysts for Fuel Cells, Achieving 0.96V Low Total Overpotential Compared to Pt/C	ACS Publications (Chemistry of Materials)	2026-07-02	US	Nanotechnology
S3-25	Haydale Demonstrates Component-Scale Production of Nanocarbon Composites, Accelerating Lightweighting and High-Performance in Aerospace and Automotive Industries	Engineer Live	2026-07-03	UK	Nanotechnology
S3-26	OCSiAl: Luxembourg's Nanotech Unicorn Leads Global Graphene Nanotube Revolution, Dominating Startup Rankings	StartupBlink	2026-07	Luxembourg	Nanotechnology
S3-27	Advanced AF4-SANS Coupling Revolutionizes Nanoparticle Drug Delivery Characterization, Paving Way for Safer, More Efficacious Therapies	News-Medical.Net	2026-07-10	Global	Nanotechnology
S3-28	Cornell Researchers Eradicate Aggressive Prostate Cancer in Mice Using Ultrasmall Silica Nanoparticles (C' dots)	ScienceDaily	2026-07-09	US	Nanotechnology
S3-29	Sapu Nano's SP-03-B101 Phase 1b Trial Reports No Dose-Limiting Toxicities in Initial Cohort, Recommends Dose Escalation and European Expansion	Media OutReach Newswire	2026-07-09	US	Nanotechnology
S3-30	GMG Graphene Coating THERMAL-XR® ENHANCE Achieves Unprecedented 30,000 Hours of Corrosion-Free Performance in Salt Spray Testing	Newsfile Corp.	2026-07-09	Australia	Nanotechnology
S3-31	University of Florida Develops 'Molecular Velcro' Technique for Efficient PFAS Removal from Water, Revolutionizing Filtration	WUFT News	2026-07-06	US	Nanotechnology
S3-32	Glacier Fresh Reports 2026 Progress: UF & NF Membranes Now More Practical for Daily Use, Featuring Enhanced Fouling Resistance	Glacier Fresh	2026-XX-XX	Global	Nanotechnology
S4-01	Henkel Forges Exclusive US Distribution Partnership with Applied Adhesives to Dominate Flexible Packaging Market	PR Newswire	2026-07-08	US	Adhesives & Encapsulants
S4-02	BindEthics Launches Industrial-Scale Production of Bio-based, Formaldehyde-Free Ecohesive™ Adhesive	Packaging Europe	2026-07-06	UK	Adhesives & Encapsulants
S4-03	Belgian Chemical Firm Syensqo Breaks Ground on Multi-Million Dollar US Expansion to Boost Aerospace Adhesives by Over 30%	Industrial Equipment News	2026-07-09	US	Adhesives & Encapsulants
S4-04	New UL 746E-2026 Regulation Mandates <15% Curing Performance Degradation for UV Adhesives After 500 Hours of Continuous Jetting in North America	Industry Compliance Update	2026-07-05	US	Adhesives & Encapsulants

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S4-05	Arkema Unveils Advanced PVDF and Acrylic Binders for EV and ESS Batteries at The Battery Show Europe 2026, Boosting LFP Performance and Driving Solid-State Development	CoatingsPro	2026-07-07	France	Adhesives & Encapsulants
S4-06	Researchers Develop UV-Cured Coatings with Reversible Adhesion via Disulfide Bonds, Unlocking New Possibilities for Recyclable Multi-Layer Packaging	European Coatings	2026-07-09	Germany	Adhesives & Encapsulants
S4-07	Shin-Etsu Silicones Unveils Innovative Cosmetic Raw Materials, Including Low-Viscosity Oil Thickening Silicone Crosspolymers and Alkyl/Polyglycerin Co-modified Elastomer Gels	Happi	2026-07-07	Japan	Adhesives & Encapsulants
S4-08	Dymax Unveils Low-Shrinkage, High-Clarity UV Curable OP Series Optical Adhesives for Precision Optical Bonding and Lens Assembly	Intertronics	2026-07-XX	UK	Adhesives & Encapsulants
S4-09	Malaysian Consortium Initiates Pilot Line Development for High Bandwidth Memory (HBM) Advanced Packaging, with NSW Automation Providing Precision Adhesive Dispensing	The Star	2026-07-03	Malaysia	Adhesives & Encapsulants
S4-10	Amkor Technology to Unveil Advanced Power Module Packaging Technologies for the AI Era at SEMI Advanced Packaging Summit 2026	Amkor Technology	2026-07-06	South Korea	Adhesives & Encapsulants
S4-11	Amkor Technology Presents Large Package Performance Evaluation of Glass Core Substrates for AI and HPC Applications at ECTC 2026	Amkor Technology	2026-07-06	South Korea	Adhesives & Encapsulants
S4-12	3M to Announce Q2 2026 Earnings on July 21, Highlighting Diverse Product Portfolio in Industrial, Electronic, and Healthcare Markets	MarketBeat	2026-07-10	US	Adhesives & Encapsulants
S4-13	Covestro Expands Global Production Capacity with Acquisition of Two HDI Derivative Plants in Thailand and USA	Plastics Today	2026-07-02	Germany	Adhesives & Encapsulants
S4-14	LyondellBasell and Mondelez Collaborate to Commercialize Marabou Chocolate Packaging Sourced from 75% Recycled Plastic, Utilizing 100% Recycled Content CirculenRevive Polymers	LyondellBasell - Investors	2026-07-07	Netherlands	Adhesives & Encapsulants
S4-15	DELO Unveils PHOTOBOND SJ4192: A High-Performance Multi-Purpose Adhesive Primarily Composed of Bio-Based Components	DELO Press Release	2026-07-02	Germany	Adhesives & Encapsulants

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S4-16	Sumitomo Bakelite Realigns 2026 CapEx to Asian Fabrication Nodes as 35.7% Operating Profit Expansion Signals Structural De-commoditization in Semiconductor Encapsulation Materials	HDIN Research	2026-07-07	Japan	Adhesives & Encapsulants
S4-17	Indium Corporation Expert to Present TIM Solutions for AI Thermal Challenges at IMAPS ThermCon, Focusing on Gold-Based Die Attach Preforms for High-Power Laser and RF Applications	Indium Corporation	2026-07-02	US	Adhesives & Encapsulants
S4-18	H.B. Fuller Prioritizes High-Value Markets Following Portfolio Restructuring and Flooring Business Divestiture, Achieving 5.8% Revenue Growth and Improved Margins	Zacks.com	2026-07-09	US	Adhesives & Encapsulants
S4-19	TSMC Accelerates Backend Ecosystem Reorganization, Reshaping Semiconductor Competitive Landscape as Advanced Packaging Breaks Process Shrinkage Limits	The Economy	2026-07-09	Taiwan	Adhesives & Encapsulants
S4-20	Micro-CT Emerges as Key Non-Destructive 3D Analysis Approach for Semiconductor Package Warpage, Addressing Critical Reliability Challenges	AZoM	2026-07-09	UK	Adhesives & Encapsulants
S4-21	Henkel Reports Strong Q1 2026 Organic Sales Growth of 1.7%, Driven by Adhesive Technologies Sector, Completes €1 Billion Share Buyback	Henkel	2026-07-07	Germany	Adhesives & Encapsulants
S4-22	Strategic Packaging Insights Forecasts De-seamable Adhesives Market to Reach \$3.12 Billion by 2034, Driven by Demand for Sustainable Bonding Solutions	openPR.com (Strategic Packaging Insights Inc.)	2026-07-09	US	Adhesives & Encapsulants
S4-23	openPR Forecasts Aerospace Adhesive and Sealants Market to Rapidly Grow to \$2.09 Billion by 2033	openPR.com	2026-07-08	India	Adhesives & Encapsulants
S4-24	openPR Forecasts Dental Adhesives and Sealants Market to Reach \$10.44 Billion by 2030, Driven by 10.0% CAGR	openPR.com	2026-07-06	India	Adhesives & Encapsulants
S4-25	IDTechEx Analyzes Materials Shaping the Future of Advanced Semiconductor Packaging, Including 2.5D/3D Cu-Cu Hybrid Bonding and Glass Panel-Based Technologies	IDTechEx	2026-07-07	UK	Adhesives & Encapsulants
S4-26	openPR Forecasts Instant Adhesive Market to Grow to \$4.62 Billion by 2033, Driven by 6.8% CAGR	openPR.com	2026-07-08	India	Adhesives & Encapsulants

ID	Title	Source	Date	Region	Sub-Topic
S4-27	Data Insights Reports Forecasts Electronic Circuit Board Underfill Market Growth Driven by Advanced Semiconductor Packaging Demand, Emphasizing Nano-Fillers for Enhanced Thermal Conductivity and Low-Viscosity for Sub-80 µm Bump Pitch	Data Insights Reports	2026-07-08	India	Adhesives & Encapsulants

Editor's Note

Navigating the Materials Revolution: Strategic Imperatives for Western Leadership

The materials and chemistry sector is undergoing profound transformation, driven by AI, nanotechnology, and sustainability. Western manufacturers must rapidly innovate to capture high-growth markets in energy, electronics, and advanced manufacturing. Building resilient, circular supply chains, independent of geopolitical risks, is also crucial. AI-driven discovery and chemical recycling offer unprecedented competitive advantages.

Strategic investments in advanced materials, from solid-state battery electrolytes to rare-earth-free magnets, are critical for securing future product performance and national security. Proactive adaptation to evolving environmental regulations, like PFAS bans and e-waste recycling, is a pathway to market differentiation. Western players must prioritize collaborative R&D;, strategic M&A;, and agile supply chain management for industrial leadership.

The shift towards advanced packaging in semiconductors and demand for lightweight, high-performance aerospace composites underscore the need for integrated material solutions. Companies combining functional materials, polymers, and nanotechnologies will unlock new performance and efficiency. This requires a holistic view of the materials value chain, from sourcing to recycling, ensuring innovation is cutting-edge and environmentally responsible.

- ◆ How can Western manufacturers accelerate the qualification and integration of AI-discovered materials into commercial products within 12-18 months?
- ◆ What specific investments are required to establish secure, circular supply chains for critical materials (e.g., rare earths, battery components) to reduce reliance on non-Western sources by 2030?
- ◆ What cross-sectoral partnerships can best leverage advancements in nanotechnology and smart polymers to create new high-value applications in medical, energy, and defense sectors?

Troy Technical Weekly Editorial Team Editorial Assistant

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