Nanotechnology

Weekly Intelligence Report

2026-06-28 | 25 articles | 11 countries

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This Week's Keyword

Nanotech Advancements

From Batteries to Biotech & IP Challenges

25	11	25.7	99
articles	countries	%	%
Total Articles Analyzed	Source Countries	Perovskite Solar Eff.	Bacterial Reduction

All 25 Articles This Week — 5-Axis Evaluation Matrix

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

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#01	NTeC-B for Li-ion Batt	New Product	●●●○○	●●●●○	●●●●○	●●●●○	●●●●●	Birla Carbon & Chasm co-develop NTeC-B, a hybrid carbon black/CNT additive for next-gen Li-ion batteries.
#02	Quantum Dot Solar Cells	Research Review	●●○○○	●●○○○	●●●○○	●●●●●	●●●●○	Review surveys breakthroughs in materials and device engineering for quantum dot solar cells, boosting efficiency.
#03	Advanced Nanomedicine	Research Review	●●○○○	●●○○○	●●●○○	●●●●●	●●●●○	Article collection highlights nanomedicine strategies for precision therapeutics via bioresponsive materials, LNPs, metal nanostructures.
#04	Nanocomposites for Auto	Market Overview	●●○○○	●●●○○	●●●●○	●●●○○	●●●●○	Conference highlights nanocomposite innovations for lightweight, high-performance aerospace and automotive solutions.
#05	OCSiAl Patent Dispute	Corporate Strategy	●○○○○	●●●●●	●●●●●	●●○○○	●●●●○	Russian court orders 9.36B ruble recovery from OCSiAl founder's companies in graphene nanotube patent dispute.
#06	Nanocellulose Materials	Market Overview	●●○○○	●●●○○	●●●○○	●●●○○	●●●●○	Nanocellulose-based materials showcased for diverse applications from food packaging to biomedicine.
#07	OCSiAl to Supply PowerCo	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●●○	●●●●●	OCSiAl to supply single-wall carbon nanotubes to Volkswagen Group's PowerCo for EV battery platform.
#08	Sigma-Aldrich PbS QDs	Research Overview	●●○○○	●●○○○	●●●○○	●●●●○	●●●●●	Sigma-Aldrich highlights PbS quantum dot photovoltaic applications and core/shell QD structure advances.
#09	OCSiAl at APFE 2026	New Product	●●○○○	●●●●○	●●●○○	●●○○○	●●●●●	OCSiAl to showcase graphene nanotubes at APFE 2026 Shanghai for films, adhesives, and coatings.
#10	OCSiAl News Archive	Corporate Announcement	●○○○○	●●●●●	○○○○○	●●○○○	●●●○○	OCSiAl launches news archive page for carbon nanotube applications and corporate announcements.
#11	Light-Activated Nanomats	Research	●●●●○	●●○○○	●●●●○	●●●●●	●●●●●	Light-activated nanomaterials achieve 99% bacterial reduction in animal studies for antibiotic-resistant wound infections.
#12	OCSiAl to Supply PowerCo	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●●○	●●●●●	OCSiAl to supply TUBALL single-wall carbon nanotubes for PowerCo's "Unified Cell" battery platform.

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#13	Prinano Nanoimprint Litho	New Product	●●●●○	●●●○○	●●●●○	●●●○○	●●●●○	China's Prinano validates 8-inch photonic chip production with nanoimprint lithography at 1/10th cost.
#14	Beam Therapeutics LNP	Clinical Trial	●●●●○	●●●○○	●●●●○	●●●●○	●●●●○	Beam Therapeutics receives FDA IND clearance for liver-targeted LNP formulation BEAM-304 for PKU treatment.
#15	Argo Graphene License	Corporate Strategy	●●●○○	●●●○○	●●●○○	●●○○○	●●●●○	Argo Graphene Solutions closes license agreement for Grapherry's STREAM graphene production platform.
#16	Drug-Free Nanoparticles	Research	●●●●○	○○○○○	●●●●○	●●●●○	●●●●○	Technion scientists halt triple-negative breast cancer in mice with drug-free nanoparticles.
#17	Labcorp LNP Dev	Corporate Strategy	●●○○○	●●●●○	●●●○○	●●●○○	●●●●○	Labcorp strengthens Lipid Nanoparticle (LNP) development as non-viral vectors for vaccine and cell/gene therapy.
#18	Chinese Ag Nanowires	Research	●●●●○	●●○○○	●●●●○	●●●●○	●●●●○	Chinese researchers achieve efficient synthesis of ultra-long, high-yield silver nanowires for transparent conductors.
#19	Canon Nanoimprint Target	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●○○	●●●●○	Canon sets 25% industrial unit profit margin target by FY2030, focusing on nanoimprint technology commercialization.
#20	Cytiva mRNA-LNP Delivery	Research	●●●●○	●●○○○	●●●●○	●●●○○	●●●●○	Cytiva advances extrahepatic mRNA-LNP delivery to spleen for in vivo CAR therapeutics.
#21	Nanoremediation Cleanup	Market Overview	●●○○○	●●●○○	●●●○○	●●●○○	●●●●○	Nanoremediation revolutionizes environmental cleanup with enhanced pollutant removal efficiency.
#22	Albumin-Hitchhiking LNP	Research	●●●●○	○○○○○	●●●●○	●●●●○	●●●●○	Novel LNP reduces liver accumulation by 80% and increases lymphatic mRNA expression 2-3x via albumin-hitchhiking.
#23	NDDS Personalized Med	Market Overview	○○○○○	●●●●○	●●●○○	●●●○○	●●●●○	Nanotechnology-based drug delivery systems drive personalized medicine with approved formulations for diverse diseases.
#24	Anodyne GLP-1 Patch	Clinical Trial	●●●○○	●●●○○	●●●●○	●●●●○	●●●●○	Anodyne Nanotech raises $12.6M Series A to advance once-weekly GLP-1 patch ANN-101 into Phase I clinical trials.
#25	Tin Oxide QD Perovskite	Research	●●●●○	●●○○○	●●●●○	●●●●○	●●●●○	Tin oxide quantum dot layer boosts perovskite solar cell efficiency to 25.7% with enhanced stability.

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

Three Questions That Demand Your Decision This Week

❶ Is your semiconductor lithography roadmap resilient?

China's Prinano claims 8-inch photonic chip production with nanoimprint lithography at 1/10th the cost of DUV. Does this disrupt your long-term equipment procurement and manufacturing strategy, especially given Canon's aggressive NIL targets?

❷ Are your advanced material supply chains diversified?

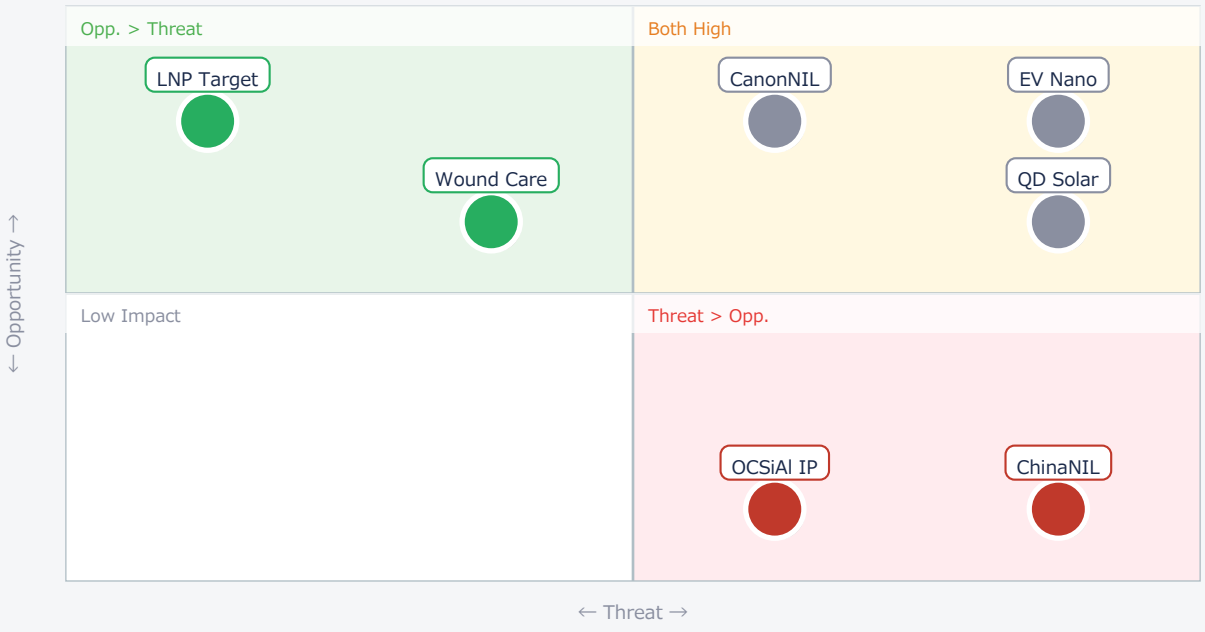
OCSiAl, a key supplier of carbon nanotubes for EV batteries (e.g., VW PowerCo), faces a major IP dispute in Russia. Is your procurement team assessing the risk of supply disruption and identifying alternative sources or technologies?

❸ How will next-gen LNP delivery impact your pipeline?

Breakthroughs in LNP targeting (e.g., albumin-hitchhiking for lymphatic delivery, extrahepatic spleen targeting) promise safer, more effective gene therapies and vaccines. Is your R&D; team evaluating these for competitive advantage in drug development?

Opportunities vs. Threats for US/European Companies

Opportunity vs. Threat Matrix for US/European Companies



Item	Quadrant	↑ Opportunity	↓ Threat
ChinaNIL	Threat	—	Market share loss
CanonNIL	Critical	Alt. supplier	Comp. pressure
EV Nano	Critical	Battery perf.	Tech lag
OCSiAl IP	Threat	Alt. supply	Supply risk
LNP Target	Opp.	Safer drugs	—
Wound Care	Opp.	New therapy	—
QD Solar	Critical	Green energy	China lead

Deep Dive ① — China's Nanoimprint Lithography Threat

#13 | 2026/06/20 | 複数の報道機関 (香港NTI、Semiconductor Engineering、Loano via YouTube) | Tech Novelty●●●●○ Proximity●●●○○ Market Impact●●●●● Data Reliability●●●○○ US/EU Relevance●●●●●

Chinese startup Prinano Technology has validated volume production of 8-inch photonic chip wafers using its PL-AS vacuum pneumatic wafer-level nanoimprint lithography (NIL) machine. This system reportedly achieves manufacturing costs one-tenth of traditional DUV solutions, with sub-2nm residual layer variation and sub-10nm features, using 100% domestically produced components.

The breakthrough aims to disrupt the market dominated by overseas suppliers like Canon, providing a critical pathway for China's semiconductor industry to reduce reliance on foreign technology and enhance supply chain resilience, particularly for optical communication modules and interconnect devices.

▶ Strategic Analyst's Perspective

Strategic Analyst's Perspective: The reported 1/10th cost and sub-10nm features for NIL are highly aggressive and, if validated independently, represent a significant leap. While NIL has niche applications, its maturation for 8-inch photonic chips with 100% domestic components is a direct challenge to US/EU lithography dominance. Technical barriers include throughput and defect density for high-volume manufacturing beyond photonic chips. [Opportunity] for US/EU OEMs to explore Prinano as a low-cost alternative for specific photonic applications, if export controls allow. [Threat] of rapid Chinese self-sufficiency and potential market share erosion for US/EU lithography equipment suppliers. Next Actions: [R&D;] Immediately benchmark Prinano's claims against current DUV/EUV capabilities. [Strategy] Assess long-term impact on semiconductor supply chain resilience by Q3 2026. [Procurement] Identify potential alternative NIL suppliers and evaluate geopolitical risks.

Deep Dive ② — Albumin-Hitchhiking LNPs for Targeted Delivery

#22 | 2026/06/18 | ACS Materials Au | Tech Novelty●●●●● Proximity●○○○○ Market Impact●●●●○ Data Reliability●●●●● US/EU Relevance●●●●●

A novel lipid nanoparticle (LNP) delivery concept has been developed to overcome off-target liver accumulation and associated hepatotoxicity of mRNA therapeutics by interacting with endogenous albumin. This new LNP successfully reduced liver accumulation by approximately 80% while simultaneously increasing mRNA expression in lymph nodes by 2 to 3 times in mouse models.

This breakthrough significantly enhances the safety and targeting specificity of mRNA and nucleic acid-based therapies. By leveraging albumin as a 'hitchhiker,' the LNP avoids direct hepatic uptake, promoting access to the lymphatic system, which is ideal for vaccines and immunotherapies.

▶ Strategic Analyst's Perspective

Strategic Analyst's Perspective: This is an academic breakthrough with profound implications for nanomedicine. The 80% reduction in liver accumulation and 2-3x lymphatic expression are highly promising quantitative results from a peer-reviewed source. Remaining technical barriers include validating this mechanism in larger animal models and humans, optimizing LNP stability for albumin binding in vivo, and scaling manufacturing. [Opportunity] for US/EU biotech and pharma to develop safer, more potent mRNA vaccines and gene therapies, particularly for cancer and autoimmune diseases. This could unlock new therapeutic windows. [Threat] for companies reliant on conventional LNP designs if they cannot adapt to this advanced targeting. Next Actions: [R&D;] Initiate internal research or partnerships to explore albumin-mediated LNP delivery by Q4 2026. [Business Dev] Identify potential licensing opportunities for this technology. [Strategy] Re-evaluate long-term LNP platform investments.

Deep Dive ③ — OCSiAl to Supply VW PowerCo with SWCNTs

#07 | 2026/06/25 | OCSiAl Press room | Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●●○ Data Reliability●●●●○ US/EU Relevance●●●●●

OCSiAl has been selected to supply single-wall carbon nanotubes (SWCNTs) for Volkswagen Group's battery manufacturing subsidiary, PowerCo's Unified Cell battery platform. OCSiAl's nanotube solution will be integrated into graphite anodes to enhance the safety, charging performance, and lifespan of electric vehicle (EV) batteries.

This supply, originating from OCSiAl's Serbian facility, is poised to accelerate the development of high-performance battery technology critical for the expanding EV market. SWCNTs create an efficient conductive network, improving fast-charging, suppressing heat, and extending battery life.

▶ Strategic Analyst's Perspective

Strategic Analyst's Perspective: This is a significant commercial validation of SWCNTs in a major automotive OEM's battery platform. The performance claims (enhanced safety, charging, lifespan) are realistic given known SWCNT properties. The main technical barrier is scaling production to meet the massive demand of the EV market while maintaining cost-effectiveness and consistent quality. The recent Russian IP dispute (#05) introduces a potential supply risk for OCSiAl and its partners. [Opportunity] for US/EU materials suppliers to develop alternative high-performance conductive additives or SWCNT production methods. [Threat] for US/EU EV battery manufacturers and OEMs if they lag in adopting advanced conductive additives, potentially impacting competitive battery performance and cost. Next Actions: [Procurement] Conduct a full supply chain risk assessment for OCSiAl and similar critical materials by end of July. [R&D;] Benchmark current battery additive performance against OCSiAl's SWCNTs. [Strategy] Explore partnerships with advanced materials companies for next-gen battery components.

Other Notable Articles

Birla Carbon and Chasm Advanced Materials Co-Develop 'NTeC-B' Hybrid Conductive Additive for Next-Gen Li-ion Batteries
Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●●○

US companies co-develop hybrid carbon black/CNT additive for high-performance EV batteries, enhancing capacity and rate.

Beam Therapeutics Receives FDA IND Clearance for Liver-Targeted LNP Formulation BEAM-304 for Phenylketonuria (PKU) Treatment
Tech Novelty●●●●○ Proximity●●●○○ Market Impact●●●●○

US biotech advances liver-targeted LNP for base editing in PKU, moving to Phase 1/2 trials; potential for diet normalization.

Technion Scientists Halt Triple-Negative Breast Cancer in Mice with Drug-Free Nanoparticles
Tech Novelty●●●●● Proximity●○○○○ Market Impact●●●●○

Israeli research shows drug-free nanoparticles halting aggressive breast cancer in mice, comparable to immunotherapy.

Chinese Researchers Achieve Efficient Synthesis of Ultra-Long, High-Yield Silver Nanowires, Accelerating Transparent Conductor Applications
Tech Novelty●●●●○ Proximity●●○○○ Market Impact●●●●○

Chinese universities develop high-yield, ultra-long Ag nanowires, boosting transparent conductor potential for displays and solar.

Recommended Actions This Week

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

Immediate (this week)

- [Procurement] Assess immediate supply chain exposure to OCSiAl's carbon nanotubes due to the Russian IP dispute and identify alternative suppliers.
- [R&D;] Initiate a rapid review of Prinano's nanoimprint lithography capabilities and claims, comparing them to current DUV/EUV roadmaps for potential disruption.
- [Executive] Brief leadership on the implications of Chinese advancements in NIL and potential impacts on semiconductor manufacturing competitiveness.

Short-term (1 month)

- [Strategy] Evaluate the competitive landscape for advanced LNP delivery systems, focusing on albumin-hitchhiking and extrahepatic targeting, for future drug development.
- [Business Dev] Investigate partnership or licensing opportunities for light-activated nanomaterials in antibiotic-resistant wound care, given strong animal study results.
- [R&D;] Benchmark internal battery additive R&D; against NTeC-B and OCSiAl's SWCNT performance to ensure competitive EV battery technology.
- [Legal/IP] Conduct a preliminary review of IP protections for advanced materials and manufacturing technologies in light of international disputes.

Medium-long term (quarter+)

- [Strategy] Develop a comprehensive long-term strategy for semiconductor manufacturing resilience, including potential investments in alternative lithography technologies.
- [R&D;] Establish a dedicated program to explore internal development or acquisition of advanced LNP targeting technologies for next-generation gene therapies and vaccines.
- [Procurement] Diversify critical material sourcing strategies, particularly for advanced carbon materials and transparent conductors, to mitigate geopolitical risks.
- [Executive] Allocate resources for continuous monitoring of Chinese nanotechnology advancements, especially in areas with direct competitive implications for US/EU industries.

Nanotechnology — Selected Articles

Date: 2026-06-28

Articles: 25

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#18 Chinese Researchers Achieve Efficient Synthesis of Ultra-Long, High-Yield Silver Nanowires, Accelerating Transparent Conductor Applications

#19 Canon Sets 25% Industrial Unit Profit Margin Target by FY2030, Focusing on Nanoimprint Technology Commercialization

#20 Cytiva Advances Extrahepatic mRNA-LNP Delivery to Spleen for In Vivo CAR Therapeutics

#21 Nanoremediation Revolutionizes Environmental Cleanup with Enhanced Pollutant Removal Efficiency

#22 Albumin-Hitchhiking Lipid Nanoparticles Achieve 80% Liver Accumulation Reduction and 2-3x Lymphatic mRNA Expression

#23 Nanotechnology-Based Drug Delivery Systems Drive Personalized Medicine with Approved Formulations for Diverse Diseases

#24 Anodyne Nanotech Raises $12.6 Million Series A to Advance Once-Weekly GLP-1 Patch ANN-101 into Phase I Clinical Trials

#25 Tin Oxide Quantum Dot Layer Boosts Perovskite Solar Cell Efficiency to 25.7% with Enhanced Stability

#01 Birla Carbon and Chasm Advanced Materials Co-Develop 'NTeC-B' Hybrid Conductive Additive for Next-Gen Li-ion Batteries

Published Date unknown Birla Carbon & Chasm Advanced Materials USA

OVERVIEW

Birla Carbon and Chasm Advanced Materials have co-developed 'Nanotube-Enhanced Carbon Black' (NTeC-B), a hybrid carbon black/carbon nanotube conductive additive for next-generation lithium-ion batteries. This novel material synergistically combines carbon black's excellent dispersion with carbon nanotube's high conductivity. This is expected to enable high-capacity anodes and improved rate performance, accelerating the evolution of high-performance EV batteries.

IN DEPTH

Key Findings

Leading materials science companies Birla Carbon and Chasm Advanced Materials have announced the co-development of 'Nanotube-Enhanced Carbon Black' (NTeC-B), a hybrid carbon black/carbon nanotube conductive additive designed to significantly enhance the performance of next-generation lithium-ion batteries. This innovative material is poised to contribute to higher-capacity anodes and improved rate capabilities in battery technology.

Technical / Clinical Details

NTeC-B effectively establishes an efficient conductive network within battery electrodes by synergistically combining the superior dispersion properties of traditional carbon black with the high electrical conductivity of carbon nanotubes (CNTs). While carbon black ensures uniform distribution throughout the electrode, CNTs, with their nanoscale structure, provide a multitude of electrical pathways between active material particles. This unique hybrid architecture substantially improves the speed of electron transport, particularly in high-capacity anodes, leading to significantly enhanced fast-charge and discharge capabilities (rate performance). Furthermore, the reduction in electrode resistance may also contribute to suppressed heat generation and extended cycle life.

Background & Context

The lithium-ion battery market is experiencing rapid expansion, with production capacity projected to exceed 2 terawatt-hours (TWh) by 2026. This growth is primarily driven by the widespread adoption of electric vehicles (EVs) and increasing demand for renewable energy storage systems. However, further improvements in current battery performance are essential to extend EV driving ranges and shorten charging times. Conductive additives are a crucial determinant of electrode performance, and there has been a pressing need for more efficient and higher-performing materials.

Strategic Significance & Outlook

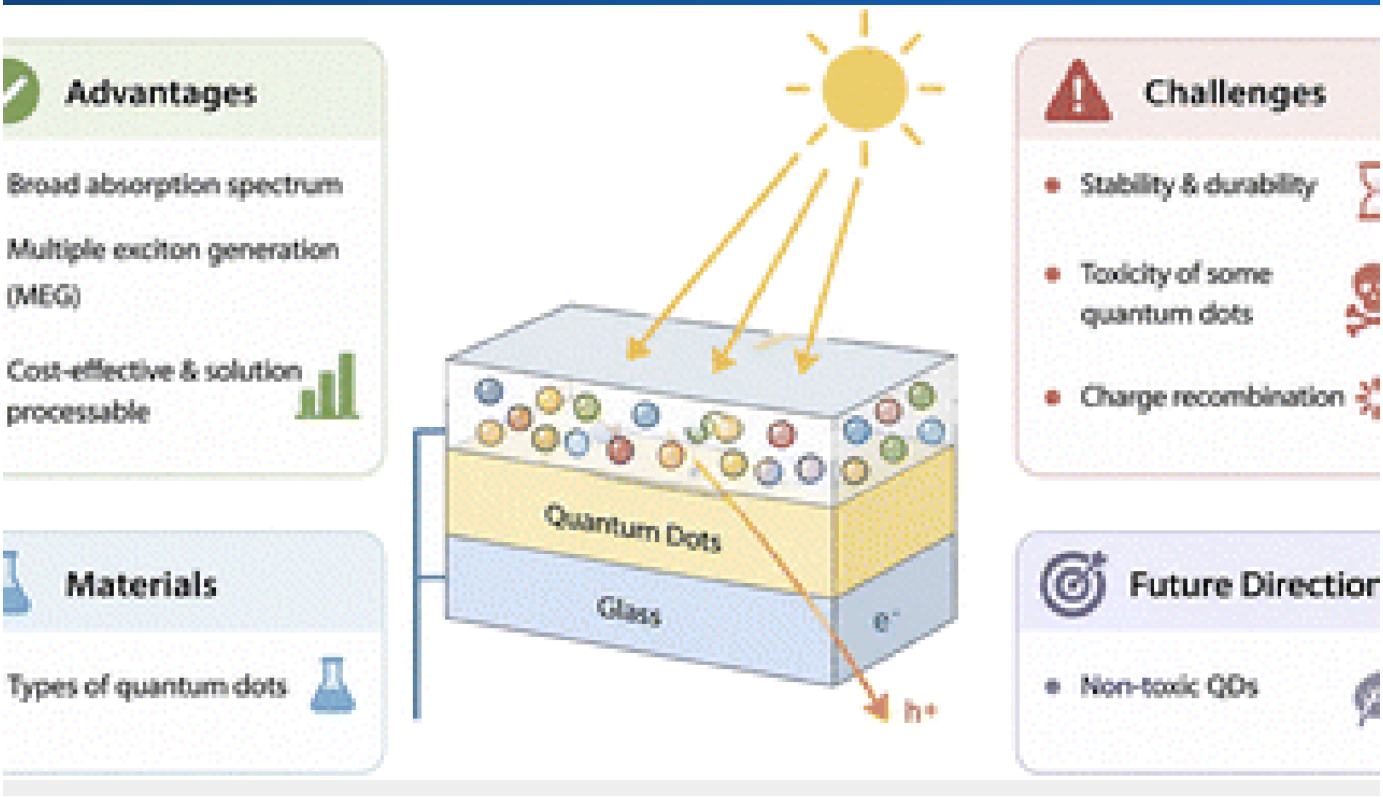
The introduction of advanced hybrid conductive additives like NTeC-B is expected to alleviate bottlenecks in lithium-ion battery technology, playing a vital role in improving the performance and cost-efficiency of electric vehicles. This technology will accelerate the development of more powerful EV batteries, contributing to the realization of a sustainable mobility society, and potentially expanding applications into other high-energy-density sectors.

Source: https://flex.semi.org/program/sustainability-and-power-panel-discussion-advanced-conductive-additives-for-next-generation-li-ion-batteries

Collected: June 26, 2026 | Automated Research System (Gemini API)

#02 RSC Advances Reviews Breakthroughs in Materials and Device Engineering Boosting Quantum Dot Solar Cell Efficiency and Stability

Published Date unknown RSC Publishing (RSC Advances) UK



OVERVIEW

A review in RSC Advances comprehensively surveys recent advancements in materials development, device engineering, interface optimization, and stability enhancement for quantum dot solar cells (QDSCs). The article focuses on comparative analyses of materials like PbS, CdSe, perovskites, graphene, and eco-friendly quantum dots, also evaluating emerging trends such as AI-driven optimization and tandem configurations. This research provides crucial insights to break QDSC performance barriers and pave the way for next-generation photovoltaics.

IN DEPTH

Key Findings

A recent review published in RSC Advances reports that quantum dot solar cells (QDSCs) are demonstrating a clear path towards significant efficiency gains and improved stability through innovations in materials science and device engineering. This comprehensive analysis integrates the latest advancements in materials development, device design, interface optimization, and long-term stability strategies, highlighting the immense potential of next-generation photovoltaic technologies.

Technical / Clinical Details

The review places a strong emphasis on the comparative analysis of various quantum dot materials, including PbS, CdSe, perovskites, graphene, and even environmentally friendly quantum dots. These materials are characterized by tunable bandgaps and high light absorption capabilities, holding the promise to surpass the Shockley-Queisser efficiency limits of conventional silicon-based solar cells. From a device engineering perspective, the article discusses the optimization of charge transport layers, reduction of interface defects, and encapsulation techniques for enhanced stability. Furthermore, emerging trends such as artificial intelligence (AI)-driven device optimization methods, tandem configurations stacking QDSCs with different absorption spectra, and the development of eco-sustainable QD materials are evaluated in detail, all of which are critical for significantly advancing QDSC performance and practical implementation.

Background & Context

Amidst the accelerating global transition to renewable energy, improving the efficiency and cost-effectiveness of photovoltaic technology remains an urgent challenge. Quantum dot solar cells have garnered significant attention as a promising next-generation solar energy technology due to their excellent photoelectric conversion properties and flexible manufacturing processes. However, previous QDSCs have faced limitations in efficiency and long-term stability. The advancements highlighted in this review offer crucial guidance for overcoming these hurdles and elevating QDSCs into commercially viable technologies.

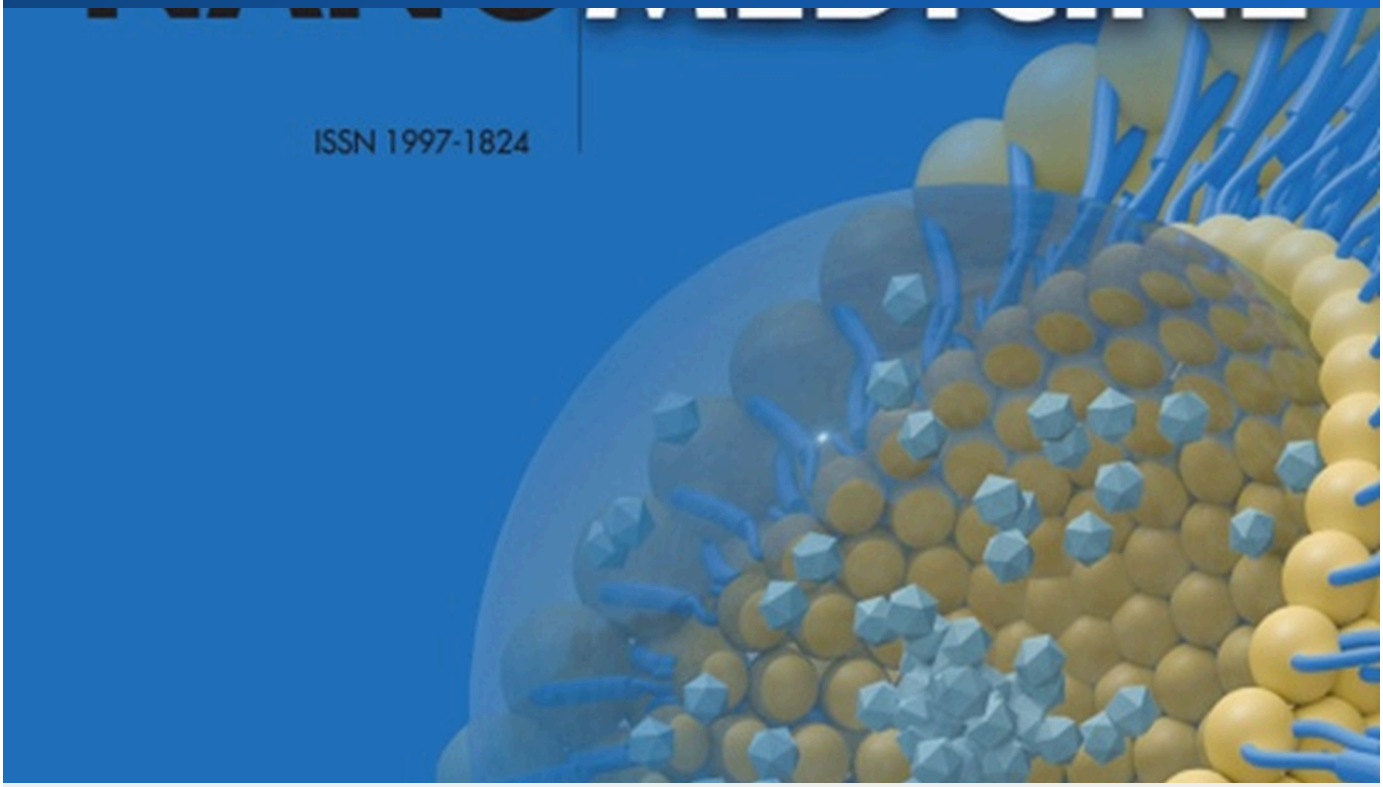
Strategic Significance & Outlook

The integrated approach to materials science and device engineering presented in this review will largely define the future direction of QDSC research. As AI-driven design optimization and the exploration of novel materials accelerate, QDSCs could potentially achieve efficiency and cost-performance metrics that surpass current mainstream solar cells. Particularly, the shift towards environmentally friendly materials is significant for contributing to a sustainable society, making future developments highly anticipated. The primary challenge for commercialization will be establishing large-scale production techniques that ensure both high efficiency and long-term stability.

Source: https://pubs.rsc.org/en/content/articlelanding/2026/ra/d6ra02771g

#03 Taylor & Francis Unveils Advanced Nanomedicine Strategies Revolutionizing Precision Therapeutics via Bioresponsive Materials, Lipid Nanoparticles, and Metal Nanostructures

Published Date unknown Taylor & Francis Online (Article Collection) UK



OVERVIEW

Taylor & Francis has published an article collection highlighting advanced nanomedicine strategies that offer unprecedented control over pharmaceutical agent delivery, revolutionizing modern therapeutics. This approach focuses on breakthroughs in bioresponsive materials, lipid-based nanoparticles, and metal nanostructures, dramatically improving drug solubility, stability, and pharmacokinetic profiles. These innovations enable precision therapeutics for small molecules and biologics alike, promising to transform contemporary treatment paradigms.

IN DEPTH

Key Findings

Taylor & Francis has released an article collection detailing advanced nanomedicine strategies poised to revolutionize modern therapeutics by providing unprecedented control over pharmaceutical agent delivery. This strategy highlights cutting-edge breakthroughs in bioresponsive materials, lipid-based nanoparticles, and metal nanostructures, which dramatically improve drug solubility, stability, and pharmacokinetic profiles, thereby ushering in a new era of precision medicine.

Technical / Clinical Details

This collection provides in-depth insights into the latest advancements in nanocarrier design for drug delivery, emphasizing three primary approaches:

- **Bioresponsive Materials:** Nanoparticles engineered to release drugs in response to specific endogenous stimuli (e.g., pH, temperature, enzyme activity). This enables targeted delivery and controlled release at the disease site, minimizing systemic side effects while maximizing therapeutic efficacy.
- **Lipid-Based Nanoparticles (LNPs):** Composed of lipids, LNPs can stably encapsulate both hydrophobic and hydrophilic drugs, protecting them from degradation in vivo. They have proven highly effective and safe, particularly in the delivery of mRNA vaccines and gene therapies.
- **Metal Nanostructures:** Metal nanoparticles, such as gold and silver, are being investigated for their unique physical and optical properties in applications like photothermal therapy and as radiosensitizers. They also function as imaging agents, facilitating the development of 'theranostic' platforms that integrate therapy and diagnostics.

These nanocarriers are crucial for enhancing the solubility, stability, and in vivo pharmacokinetic profiles of both small molecule drugs and complex biological agents (peptides, proteins, nucleic acids), leading to more effective and safer treatments.

Background & Context

Traditional drug delivery systems have faced challenges such as non-specific drug distribution, low bioavailability, and rapid degradation, leading to limited therapeutic efficacy and concerns about side effects. The advancements in nanotechnology offer innovative solutions to these issues, fundamentally transforming drug delivery. Nanomedicine provides an essential foundation for realizing personalized and precision medicine by delivering drugs to the exact location at the precise time.

Strategic Significance & Outlook

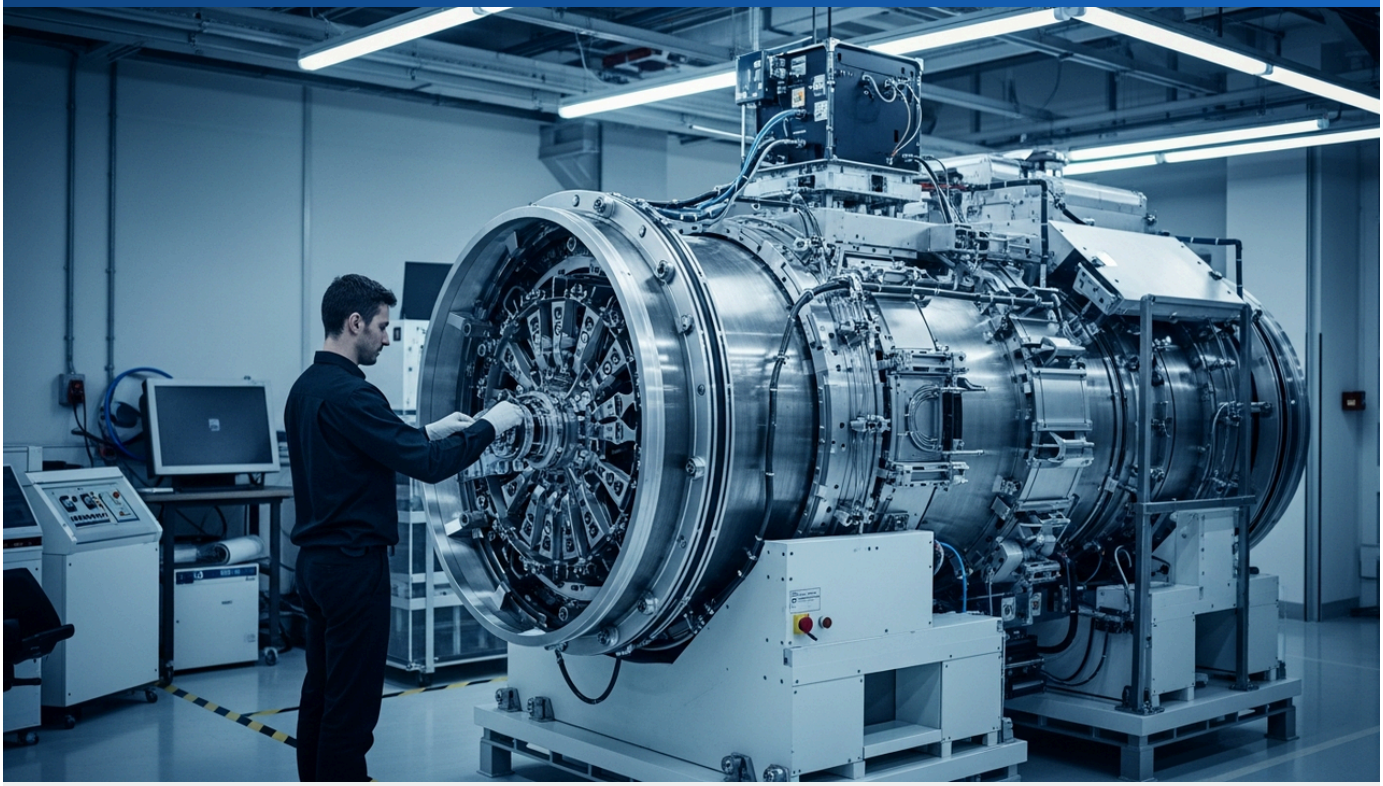
Advanced nanomedicine strategies are expected to significantly impact the development of treatments for various intractable diseases, including cancer, infectious diseases, neurodegenerative disorders, and autoimmune diseases. Particularly, as demonstrated by the success of LNPs, nanocarrier technology has the potential to accelerate the clinical application of novel modality drugs (e.g., mRNA, siRNA, CRISPR). Future efforts will focus on further optimizing these technologies, rigorous safety evaluations, and establishing large-scale manufacturing processes, which are key to widespread clinical adoption.

Source: https://think.taylorandfrancis.com/article_collections/advanced-nanomedicine-strategies-for-targeted-drug-delivery-and-precision-therapeutics/

Collected: June 26, 2026 | Automated Research System (Gemini API)

#04 Innovations in Nanocomposite Materials Address Soaring Demand for Lightweight, High-Performance Solutions in Aerospace and Automotive Industries

Published Date unknown Nanotech Conference International



OVERVIEW

A nanotechnology conference session highlighted significant advancements in nanocomposite technology, driven by increasing demand for lightweight, high-performance materials in the aerospace and automotive sectors. These materials dramatically improve strength, durability, and weight reduction, contributing to enhanced fuel efficiency and overall performance. The session explored the latest innovations in nanocomposites and lightweight materials, with a focus on their applications in these critical industries.

IN DEPTH

Key Findings

A session presentation at a recent nanotechnology conference revealed substantial progress in nanocomposite technology, directly addressing the burgeoning demand for lightweight and high-performance materials within the aerospace and automotive industries. These materials demonstrate a superior advantage in strength, durability, and weight reduction compared to conventional substances, holding significant potential to boost fuel efficiency and enhance overall product performance.

Technical / Clinical Details

Nanocomposites are fabricated by incorporating nanoscale fillers (such as carbon nanotubes, graphene, nanocellulose, or nanoclays) into matrix materials like polymers, metals, or ceramics. These nanofillers, through molecular-level interactions with the matrix, achieve property enhancements difficult to realize with traditional composite materials. Specifically, mechanical properties like tensile strength, flexural strength, and impact absorption are dramatically improved. The use of low-density nanofillers enables significant weight reduction in components, directly translating to reduced fuel consumption in aircraft and extended range for electric vehicles. Furthermore, the inherent barrier properties of nanomaterials improve corrosion and wear resistance, contributing to extended product lifespan.

Background & Context

In the aerospace industry, weight reduction remains a top priority to enhance fuel efficiency while meeting stringent safety standards. In the automotive sector, particularly with the proliferation of electric vehicles, reducing vehicle body weight to offset larger battery packs is a critical challenge. Additionally, there is a growing shift towards sustainable materials to meet carbon neutrality goals. Nanocomposites are emerging as a potent solution to address these diverse industry requirements.

Strategic Significance & Outlook

Nanocomposite technology is expected to see even wider applications across the aerospace and automotive industries in the coming years. Research and development will increasingly focus on scalability of manufacturing processes, improving cost-efficiency, and ensuring long-term performance and reliability. Moreover, the development of 'smart nanocomposites' integrating sensor functionalities or self-healing capabilities is advancing, promising to contribute to safer and more functional transportation solutions in the future.

Source: https://www.nanotechconference.org/scientific-sessions/Nanocomposites

#05 Novosibirsk Court Orders 9.36 Billion Ruble Recovery from OCSiAl Founder's Companies in Graphene Nanotube Patent Dispute

Published Published June 18, 2026 AK&M EN ロシア

OVERVIEW

A Novosibirsk regional court in Russia has ordered the recovery of 9.36 billion rubles (approximately $160 million USD) from OCSiAl founder Mikhail Predtechensky and associated companies. The ruling revokes key graphene nanotube synthesis patents from Luxembourg-based MCD Technologies S.A.R.L., declaring the Russian Federation as the sole patent holder. This decision significantly impacts OCSiAl's intellectual property, potentially reshaping its business strategy and global market standing.

IN DEPTH

Background

OCSiAl is a prominent player in the nanocarbon materials market and a global leader in the production and supply of single-walled carbon nanotubes (SWCNTs). Known for their exceptional electrical conductivity, mechanical strength, and thermal stability, graphene nanotubes are critical nanomaterials with promising applications across diverse industries, including lithium-ion batteries, composite materials, and electronics. OCSiAl's technology significantly enhances performance in various products, particularly within the electric vehicle battery sector, where it has established partnerships with major players like Volkswagen Group's PowerCo. The core of the recent legal dispute centered on the ownership of patents for the commercially successful graphene nanotube synthesis method employed by OCSiAl, which has been a significant source of its competitive advantage.

Key Findings

On June 18, 2026, the Novosibirsk Regional Court in Russia issued a landmark ruling, ordering the recovery of a total of 9.36 billion rubles (approximately $160 million USD) from Mikhail Predtechensky, the founder of leading graphene nanotube manufacturer OCSiAl, and three affiliated companies. The court acceded to the prosecutor's office's demand to revoke the patent rights for an innovative graphene nanotube synthesis method, originally developed in Novosibirsk, from the Luxembourg-based company MCD Technologies S.A.R.L. and to declare the Russian Federation as the sole patent holder. The ruling supports the prosecutor's argument that these critical patents were initially developed in Russia using public funds and subsequently improperly transferred to a foreign entity. This judgment not only establishes the Russian Federation as the legitimate owner of these patent rights but also mandates the recovery of associated revenues.

Implications & Outlook

This court decision underscores the complexities of international intellectual property rights and reflects Russia's intensified efforts to protect domestically developed technologies. While OCSiAl may appeal this decision, the substantial recovery order and patent revocation are expected to profoundly impact its business operations, future investments, and international market standing. Specifically, the patent dispute could undermine the company's technological edge and affect its relationships with supply chain partners. The outcome of this lawsuit is poised to set an important precedent for intellectual property strategies of nanotechnology-related companies operating within Russia and will likely influence the relationship between government and private enterprises. It may also prompt a critical reconsideration of intellectual property handling in international technology transfer and collaborative development projects.

Source: https://www.akm.ru/eng/news/novosibirsk-court-recovered-9-3-billion-rubles-from-ocsial-founder-s-companies-in-the-case-of-nanotu/

Collected: June 26, 2026 | Automated Research System (Gemini API)

#06 Nanocellulose-Based Materials Unveiled at Nanotechnology Conference 2026, Showcasing Diverse Applications from Food Packaging to Biomedicine

Published Date unknown Nanoscience Summit (Nanotechnology Conference-MSNC 2026) International

OVERVIEW

At the 2026 Nanotechnology Conference, nanocellulose-based materials were presented as possessing high application potential across diverse fields, from food packaging to biomedical science. These materials are biodegradable, possess high strength and stiffness while being extremely lightweight, and contribute to reducing carbon footprint as composite additives. They represent a critical solution for manufacturers aiming to deliver high-quality, environmentally conscious products.

IN DEPTH

Key Findings

At the 2026 Nanotechnology Conference (Nanotechnology Conference-MSNC 2026), it was highlighted that nanocellulose-based materials hold immense potential for application across a wide range of sectors, from food packaging to biomedical sciences. These materials are attracting significant attention as sustainable material solutions due to their excellent biodegradability and unique combination of high strength and stiffness with extremely low weight.

Technical / Clinical Details

Nanocellulose refers to cellulose fibers refined to the nanoscale, primarily categorized into three types: cellulose nanofibrils (CNF), cellulose nanocrystals (CNC), and bacterial cellulose (BC). These nanomaterials enable broad applications due to their following properties:

- **High Mechanical Properties:** With tensile strength several times that of steel and high stiffness, nanocellulose can significantly enhance the strength and durability of products when used as a reinforcing agent in composites.
- **Lightweight:** Their very low density and light weight contribute to weight reduction in automotive and aerospace sectors, directly improving fuel efficiency and energy efficiency.
- **Biodegradable and Renewable:** Being naturally derived, they have a low environmental impact and are regarded as sustainable materials, promoting their use as plastic alternatives.
- **High Specific Surface Area and Chemical Modifiability:** A high specific surface area enables their use as adsorbents, and easy surface chemical modification allows for the incorporation of specific functions (e.g., hydrophobicity, electrical conductivity).

Specifically, in food packaging, they provide excellent gas barrier properties, extending food freshness. In biomedical sciences, applications in tissue engineering scaffolds, drug delivery systems, and diagnostic sensors are highly anticipated.

Background & Context

With increasing global environmental awareness and commitments to Sustainable Development Goals (SDGs), industries urgently need to transition to materials with lower environmental footprints. The plastic waste problem, in particular, is severe, leading to a high demand for biodegradable and renewable alternative materials. Nanocellulose is positioned as one of the most promising materials to meet this need, serving as a key for manufacturers to deliver high-quality, high-performance products while reducing their carbon footprint.

Strategic Significance & Outlook

Nanocellulose-based materials, owing to their multifunctionality and environmental compatibility, are expected to be adopted in even more application areas in the future. Research and development will likely focus on improving manufacturing efficiency, reducing costs, and optimizing functionalities for specific industrial requirements. Particularly, the establishment of large-scale production technologies and further research into maximizing composite performance will be key to market expansion. This is expected to significantly contribute to achieving sustainability goals across various industries.

Source: https://nanosciencesummit.com/nanocellulose-based-materials

Collected: June 26, 2026 | Automated Research System (Gemini API)

#07 OCSiAl to Supply Single-Wall Carbon Nanotubes to Volkswagen Group's PowerCo, Boosting EV Battery Performance

Published Published June 25, 2026　OCSiAl Press room　ルクセンブルク

OVERVIEW

OCSiAl has been selected by Volkswagen Group's battery arm, PowerCo, to supply single-wall carbon nanotubes (SWCNTs) for its Unified Cell battery platform. Integrating OCSiAl's advanced nanotube solution into graphite anodes is poised to significantly improve EV battery safety, fast-charging capabilities, and overall lifespan. This strategic partnership, with supplies from OCSiAl's Serbian facility, marks a crucial step in accelerating the development of next-generation, high-performance battery technology essential for the rapidly expanding electric vehicle market.

IN DEPTH

Background

The automotive industry is undergoing a profound transformation, shifting from internal combustion engine vehicles to electric vehicles (EVs). Advancements in battery technology are a critical enabler of this market growth, with extended driving range, reduced charging times, and assured safety being paramount to bolstering consumer confidence in EVs. PowerCo's Unified Cell platform is slated for widespread adoption across future Volkswagen (VW) Group EV models, and its high-performance characteristics are directly linked to enhanced market competitiveness. This partnership between OCSiAl and PowerCo represents a strategic move to address these evolving industry demands, underscoring the pivotal role nanotechnology plays in revolutionizing automotive technology.

Key Findings

On June 25, 2026, OCSiAl announced its selection as a primary supplier of single-wall carbon nanotubes (SWCNTs) for PowerCo's Unified Cell battery platform, the dedicated battery manufacturing subsidiary of the Volkswagen (VW) Group. This strategic collaboration is anticipated to substantially enhance the safety, rapid-charging capabilities, and overall cycle life of electric vehicle (EV) batteries through the integration of OCSiAl's advanced nanotube solution into PowerCo's graphite anodes.

Technical Details

OCSiAl's single-wall carbon nanotubes offer superior performance in lithium-ion battery electrode materials compared to conventional conductive additives, primarily due to their exceptional electrical conductivity and high aspect ratio. When this nanotube solution is incorporated into graphite anodes, it establishes an incredibly efficient conductive network among the active material particles. This significantly increases electron pathways, thereby reducing the overall internal resistance of the electrode. Consequently, the battery's fast-charging capability is substantially improved, internal heat generation is effectively suppressed (a key safety enhancement), and the structural stability of the electrode is fortified by the nanotubes. This reinforcement mitigates degradation caused by volume changes during successive charge-discharge cycles, ultimately extending battery longevity. OCSiAl plans to deliver these high-performance nanotubes from its state-of-the-art manufacturing facility located in Serbia.

Strategic Significance & Outlook

The integration of OCSiAl's SWCNTs into PowerCo's EV batteries marks a significant milestone in the commercial deployment of high-performance nanocarbon materials. This technology holds the potential to influence EV battery development not only within the VW Group but also across other automotive manufacturers in the future. Moving forward, strategic focus will be placed on scaling nanotube manufacturing processes, further optimizing cost-efficiency, and meticulously fine-tuning the nanotubes within the comprehensive battery system. This advancement is projected to elevate EV battery performance to unprecedented levels and accelerate global initiatives towards a more sustainable mobility paradigm.

Source: https://ocsial.com/news/ocsial-to-supply-single-wall-carbon-nanotubes-to-powercos-salzgitters-facility

#08 Sigma-Aldrich Highlights PbS Quantum Dot Photovoltaic Applications and Core/Shell QD Structure Advances: Key to Next-Gen Solar Cell Efficiency

Published Date unknown Sigma-Aldrich USA

OVERVIEW

A Sigma-Aldrich technical article underscores the promise of quantum dot (QD)-based solar cells as a next-generation photovoltaic technology. It particularly focuses on the potential of PbS QDs in photovoltaic applications and advancements in core/shell QD structures like CdS/CuInS2. While QDs offer adjustable bandgaps, strong light absorption, solution processability, and potential to exceed Shockley-Queisser limits via multiple exciton generation, challenges remain with charge recombination and low photoanode coverage.

IN DEPTH

Key Findings

A technical article from Sigma-Aldrich emphasizes the immense promise of quantum dot (QD)-based solar cells as a next-generation photovoltaic technology. The article specifically highlights the high potential of PbS quantum dots for photovoltaic applications and the advancements in core/shell QD structures, such as CdS/CuInS2, identifying these materials as key to breaking the performance limits of conventional solar cells.

Technical / Clinical Details

Quantum dots (QDs), due to their unique quantum mechanical properties arising from their nanoscale size, offer advantages such as tunable bandgaps, exceptionally strong light absorption capabilities, and solution processability at low costs. These characteristics hold the potential to significantly enhance solar cell efficiency. Furthermore, QDs can exhibit the phenomenon of multiple exciton generation (MEG), where a single high-energy photon generates multiple electron-hole pairs, potentially allowing them to surpass the traditional Shockley-Queisser efficiency limit.

The article specifically emphasizes the following points:

- **Potential of PbS QDs:** Lead sulfide (PbS) quantum dots are identified as one of the most promising candidates for improving QD solar cell efficiency due to their broad solar spectrum absorption capability (especially in the near-infrared region) and relatively straightforward synthesis methods.
- **Core/Shell QD Structures:** QDs with core/shell structures, such as CdS/CuInS2, improve charge separation efficiency and suppress surface defects, thereby enhancing overall performance and stability. The shell layer provides surface passivation for the core QD, reducing non-radiative recombination.
- **Efficiency Challenges:** Current QD solar cells face practical efficiency challenges primarily due to rapid charge recombination and low area coverage of QDs on photoanodes (typically mesoporous TiO2 films). Active research is underway to overcome these issues.

Background & Context

As the global transition to renewable energy accelerates, further enhancing the efficiency and cost-effectiveness of photovoltaic technology is an urgent imperative. Conventional silicon-based solar cells are characterized by high manufacturing costs and are approaching their physical efficiency limits. QD solar cells are attracting significant attention as a next-generation innovative photovoltaic technology due to their potential for low-cost manufacturing and applicability to flexible substrates.

Strategic Significance & Outlook

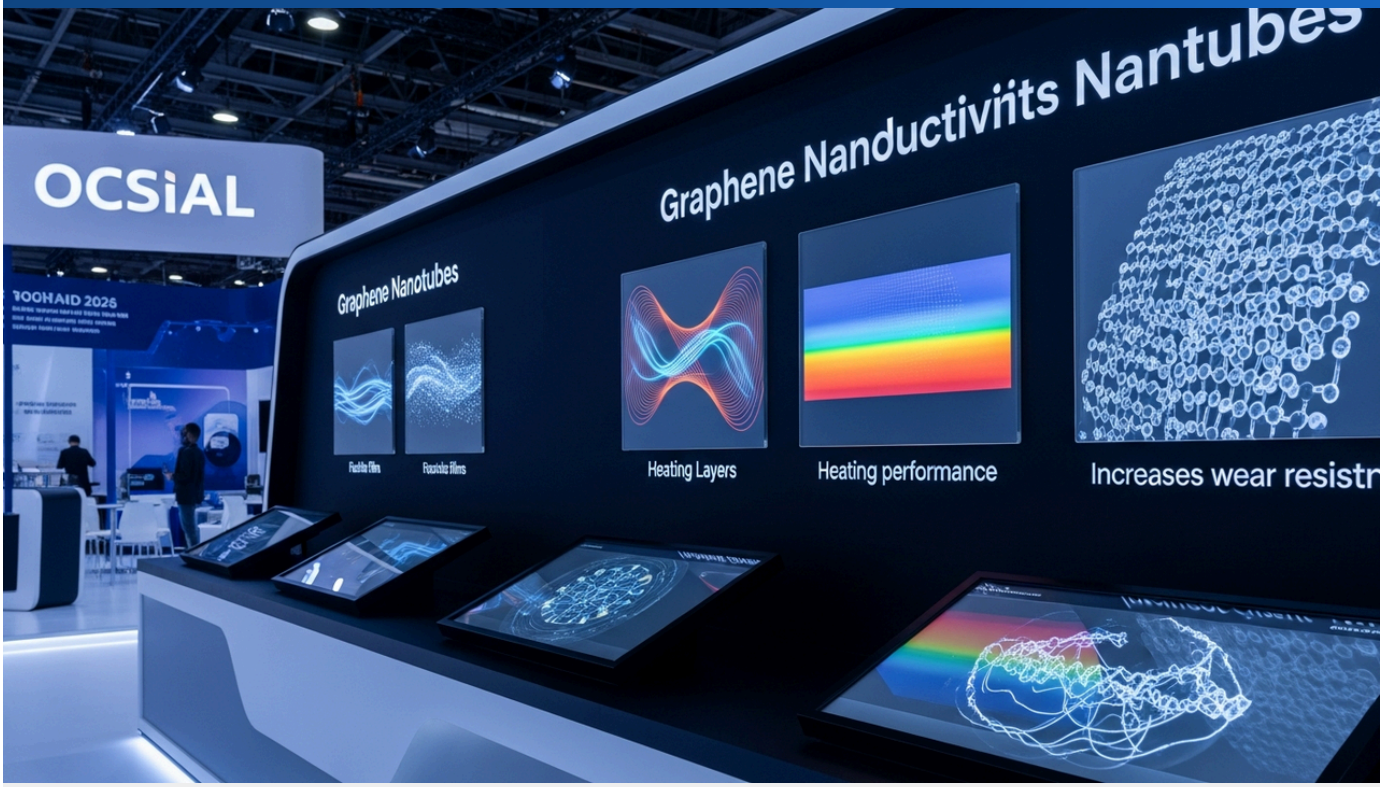
QD solar cells, with their intrinsic properties, possess the potential to break through the limitations of conventional solar cells. Future research will primarily focus on suppressing charge recombination, improving the quality of QD layers, optimizing interfaces with photoanodes, and developing mega-scale manufacturing processes. If these challenges are addressed, QD solar cells are expected to achieve low-cost, high-efficiency energy production and play an indispensable role in the global energy transition.

Source: https://www.sigmaaldrich.com/US/en/technical-documents/technical-article/materials-science-and-engineering/photovoltaics-and-solar-cells/quantum-dot-solar-cells

Collected: June 26, 2026 | Automated Research System (Gemini API)

#09 OCSiAl to Showcase Graphene Nanotubes at APFE 2026 Shanghai: Boosting Electrical Conductivity, Heating Performance, and Wear Resistance in Films, Adhesives, and Coatings

Published Published June 24, 2026　OCSiAl Events　ルクセンブルク



OVERVIEW

OCSiAl will showcase its cutting-edge TUBALL™ graphene nanotube technology at APFE 2026 in Shanghai from June 24-26. These single-walled carbon nanotubes significantly improve electrical conductivity, heating capabilities, and wear resistance in films, adhesives, and coatings, achieving superior material performance with an ultra-low loading of just 0.04 wt.%. This innovation promises to deliver high-performance, cost-effective material solutions across diverse industrial applications.

IN DEPTH

Background

Modern industries are in constant pursuit of materials that integrate high performance, durability, multi-functionality, and sustainability. Across critical sectors such as electronics, automotive, aerospace, construction, and packaging, there is an urgent need for novel solutions to overcome the inherent limitations of conventional materials. Carbon nanotube technology stands out as one of the most promising nanomaterials poised to meet these complex demands, with significant global strides in research, development, and commercialization. OCSiAl, a recognized world leader in the mass production of single-walled carbon nanotubes (SWCNTs), is strategically positioned to address these evolving market needs with its advanced product offerings.

Key Findings

OCSiAl has announced its participation in APFE 2026 (Asia International Tape, Film & High Functional Materials Expo), scheduled for June 24-26 in Shanghai, where it will exhibit its innovative graphene nanotube technology at Booth 5T076. The company's flagship TUBALL™ nanotubes are engineered to impart stable electrical conductivity, exceptional heating performance, high light absorption, effective dust-repellent properties, and enhanced wear resistance across a broad spectrum of materials, including films, adhesives, and coatings. This exhibition will highlight the transformative impact of these nanotubes on material value and performance.

Technical Details

The graphene nanotubes pioneered by OCSiAl, specifically the TUBALL™ series, are single-walled carbon nanotubes (SWCNTs). Their unparalleled nanoscale structure facilitates performance enhancements that were previously unattainable with traditional conductive fillers, opening new avenues for material design and application.

- **Stable Electrical Conductivity:** TUBALL™ nanotubes establish an extraordinarily efficient conductive network within material matrices at remarkably low loading levels—as little as 0.04 wt.%. This capability is critical for achieving stable electrical conductivity essential for advanced applications such as electrostatic discharge (ESD) protection and electromagnetic interference (EMI) shielding.

- **Enhanced Heating Performance and Light Absorption:** Leveraging their superior thermal conductivity and strong light absorption characteristics, these nanotubes are ideally suited for next-generation heating films, highly sensitive optical sensors, and even advanced stealth materials requiring precise thermal management and signature control.
- **Dust-Repellent Effect and Wear Resistance:** Incorporating TUBALL™ nanotubes into material surfaces demonstrably improves surface hardness and wear resistance. Furthermore, they confer a significant dust-repellent effect by fortifying the material against external physical damage and inhibiting particle adhesion, extending product lifespan and reducing maintenance.
- **Exceptional Effectiveness at Low Dosing:** The ability to deliver these substantial performance enhancements with an extremely minimal additive amount (just 0.04 wt.%) represents a profound advantage. This ultra-low dosing maintains the critical physical properties—such as transparency and flexibility—of the original material, while simultaneously boosting product value and optimizing manufacturing costs.

The OCSiAl booth at APFE 2026 is expected to feature practical application examples, offering tangible demonstrations of how these advanced nanotubes fundamentally improve the properties of various industrial materials.

Strategic Significance & Outlook

OCSiAl's presence at APFE 2026 will serve to emphasize the expansive and diverse application potential of its graphene nanotubes across films, adhesives, and coatings. Looking ahead, TUBALL™ nanotubes are poised to be a key catalyst for product innovation across numerous industries, contributing to the development of smarter and more durable electronic components, energy-efficient building materials, and high-performance automotive parts. Continued optimization of manufacturing processes and comprehensive evaluation of compatibility with an ever-wider array of matrix materials are anticipated to be crucial drivers for accelerating market penetration and expanding commercial adoption.

Source: https://ocsial.com/events/ocsial-at-apfe-2026/

#10 OCSiAl Launches News Archive Page: Comprehensive Resource for Carbon Nanotube Applications and Corporate Announcements

Published Published Date unknown　OCSiAl News　ルクセンブルク

OVERVIEW

OCSiAl has launched a new news archive page, offering a comprehensive historical resource for its carbon nanotube technology applications and corporate announcements. This platform consolidates past releases, enabling researchers, engineers, and investors to efficiently track OCSiAl's innovations, market trends, and strategic developments in nanocarbon materials.

IN DEPTH

Background

The field of nanotechnology and nanomaterials is experiencing rapid evolution, with carbon nanotubes (CNTs), in particular, garnering significant attention across numerous industries due to their exceptional properties. Companies such as OCSiAl are at the forefront of this market, commercializing these advanced materials and generating substantial value in diverse application sectors. Transparent information disclosure is critical for stakeholders to comprehend the company's strategic direction, technological development progress, and market impact.

Key Findings

OCSiAl has unveiled a new, dedicated news archive page on its corporate website. This platform is designed as a comprehensive resource, offering detailed information on OCSiAl's pioneering carbon nanotube technology applications, key corporate announcements, and relevant market trends. Importantly, it consolidates past news releases, serving as a primary information hub for researchers, engineers, and investors seeking to efficiently track OCSiAl's innovations and strategic developments.

Technical Details

OCSiAl stands as a global leader in the manufacturing and application of high-performance single-walled carbon nanotubes (SWCNTs). SWCNTs are highly valued as advanced materials across diverse industries—including batteries, automotive, aerospace, construction, and electronics—attributed to their superior electrical conductivity, exceptional mechanical strength, robust thermal stability, and low density. The newly launched OCSiAl news archive provides insights into specific technological applications such as:

- **Battery Performance Enhancement:** Documenting instances of SWCNT integration to significantly improve the energy density, fast-charging capabilities, and cycle life of lithium-ion batteries, alongside announcements on novel conductive additives.
- **Composite Material Reinforcement:** Showcasing application examples where the incorporation of SWCNTs into matrix materials like polymers, rubber, and cement substantially enhances material strength, durability, conductivity, and wear resistance.

- **Electronics and Sensors:** Detailing cases where SWCNTs enable the development of next-generation electronic devices, including flexible electronics, advanced conductive inks, and high-sensitivity sensors.
- **Sustainable Solutions:** Highlighting announcements on how SWCNTs contribute to reducing CO2 emissions in material manufacturing processes and enhancing recyclability.

This compilation of information underscores the critical role of OCSiAl's products in addressing complex industrial challenges and propelling technological innovation forward.

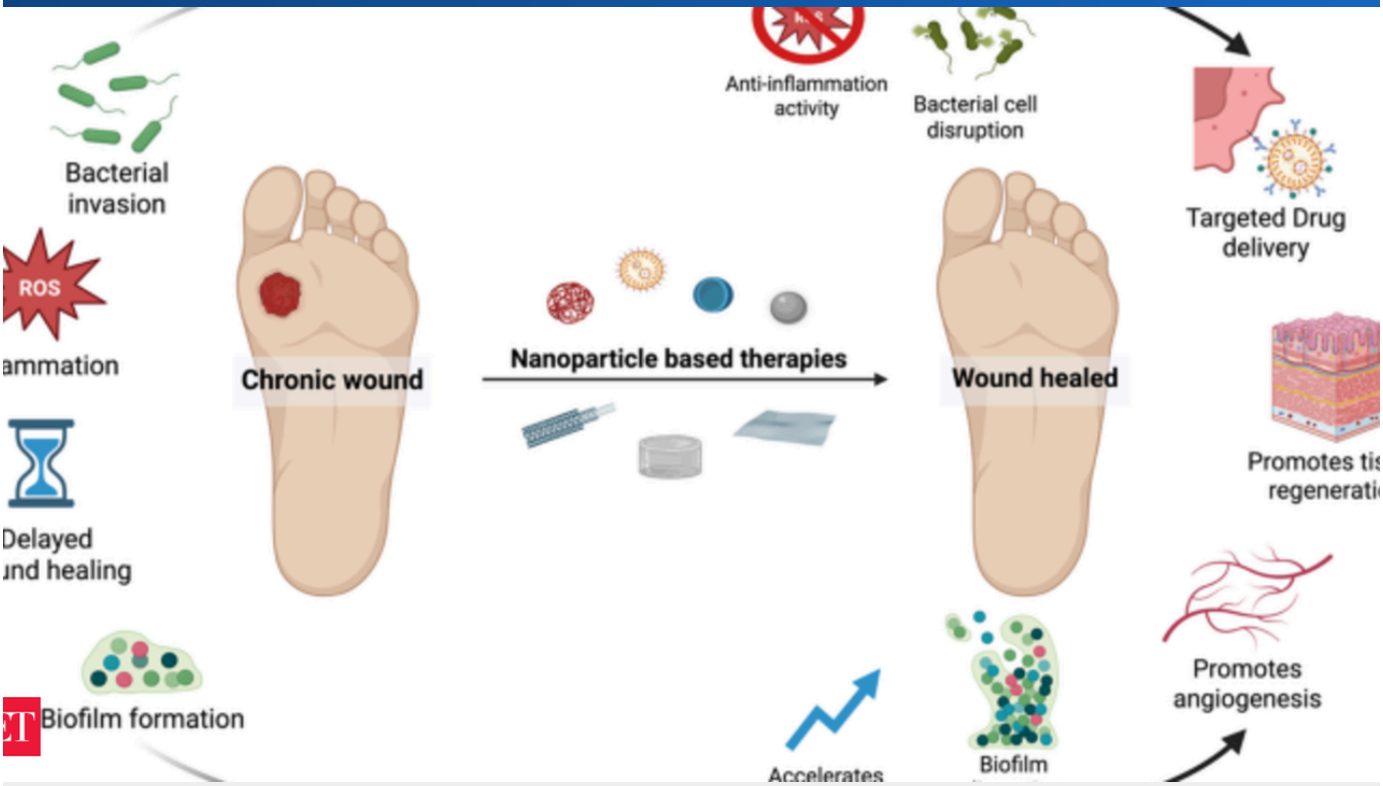
Strategic Significance & Outlook

OCSiAl's introduction of this news archive page underscores the company's unwavering commitment to solidifying its leadership in the nanocarbon materials market and proactively identifying future growth avenues. The platform is expected to precede further announcements concerning new product developments, strategic partnerships, and global market expansion. Ultimately, this comprehensive information platform will serve as a crucial window into how OCSiAl's technological innovations are actively shaping the landscape of next-generation high-performance materials and sustainable solutions.

Source: https://ocsial.com/news/

#11 Light-Activated Nanomaterials Achieve 99% Bacterial Reduction in Animal Studies for Antibiotic-Resistant Wound Infections

Published June 18, 2026 The Economic Times India



OVERVIEW

Scientists have developed light-activated nanomaterials that demonstrated up to 99% bacterial reduction in animal studies for antibiotic-resistant wound infections, including those with biofilms. This breakthrough combines gold nanoparticles and graphene oxide quantum dots to generate controlled heat and reactive oxygen species, promoting faster healing. The technology offers a critical solution for difficult-to-treat conditions like diabetic ulcers and severe burns, addressing a major challenge in modern medicine.

IN DEPTH

Key Findings

Light-activated nanomaterials have achieved up to a 99% reduction in bacterial load in animal studies for dangerous, antibiotic-resistant wound infections. This innovative approach could revolutionize the treatment of chronic wounds such as diabetic ulcers and severe burns, where conventional antibiotic therapies often fail.

Technical / Clinical Details

- The therapeutic system leverages light-activated nanomaterials specifically designed to target and neutralize antibiotic-resistant bacteria, including those entrenched within protective biofilms.
- The core technology involves a synergistic combination of gold nanoparticles and graphene oxide quantum dots. Upon light exposure, these nanomaterials generate localized, controlled heat and produce reactive oxygen species, which collectively destroy bacterial cells.
- Preclinical studies conducted in animal models have robustly demonstrated that this nanomaterial therapy can reduce bacterial counts in wound sites by up to 99%, a level of efficacy often unachievable with current antibiotic regimens alone.
- This dual-action mechanism, combining photothermal and photodynamic effects, enables the nanomaterials to penetrate and dismantle biofilms, a common culprit in persistent and recurrent infections.

Background & Context

The global rise of antibiotic-resistant bacteria poses a severe public health threat, with wound infections being particularly challenging due to limited effective treatment options. Biofilm formation further complicates matters, as it shields bacteria from both immune responses and antibiotic penetration. This nanotechnology-based therapy directly addresses this critical unmet medical need.

The field of nanomedicine is actively exploring nanoparticle-based antimicrobial strategies for their potential in targeted delivery and overcoming resistance mechanisms. This research represents a significant paradigm shift by employing physicochemical mechanisms to combat bacteria without relying on traditional pharmaceutical agents.

Strategic Significance & Outlook

These promising animal study results mark a crucial step towards human clinical application. It is anticipated that these light-activated nanomaterials could become a standard treatment for severe wound infections caused by multidrug-resistant pathogens like MRSA, significantly improving patient outcomes and potentially reducing healthcare costs. Further clinical trials are now essential to validate the safety and efficacy in human subjects.

Source: https://m.economictimes.com/news/international/us/a-new-nanotech-breakthrough-could-help-heal-dangerous-wounds-antibiotics-cant-treat/articleshow/131832665.cms

Collected: June 26, 2026 | Automated Research System (Gemini API)

#12 OCSiAl to Supply TUBALL Single-Wall Carbon Nanotubes for PowerCo's "Unified Cell" Battery Platform

Published Published June 25, 2026　OCSiAl　ルクセンブルク

OVERVIEW

OCSiAl, a global leader in single-wall carbon nanotube production, will supply its TUBALL nanotubes to PowerCo, Volkswagen Group's battery manufacturing subsidiary, for integration into its 'Unified Cell' battery platform. These nanomaterials significantly enhance graphite anodes by boosting electrical conductivity and heat dissipation, enabling higher charging/discharging currents without detrimental overheating. This advancement promises improved battery safety, faster charging, and extended service life for electric vehicles, with supply originating from OCSiAl's Serbia facility to bolster European critical material supply chains.

IN DEPTH

Background

The electric vehicle (EV) market's rapid expansion intensifies the demand for superior battery technology, with automotive manufacturers prioritizing performance, safety, and longevity. Key objectives include faster charging capabilities, increased energy density, and robust safety profiles, especially during rapid charge cycles. In response, Volkswagen Group's PowerCo established its 'Unified Cell' strategy, targeting vertical integration and performance optimization in battery manufacturing. This initiative underscores the critical need for advanced materials. Single-wall carbon nanotubes (SWCNTs), recognized for their exceptional electrical and mechanical properties, are emerging as a prime candidate for next-generation battery components, leading to a growing integration of such nanomaterials into core automotive supply chains.

Key Findings

OCSiAl has announced a significant agreement to supply its TUBALL single-wall carbon nanotubes (SWCNTs) to PowerCo, Volkswagen Group's battery manufacturing subsidiary. These advanced nanomaterials are slated for integration into PowerCo's 'Unified Cell' battery platform, marking a crucial advancement for next-generation EV battery performance and safety.

At the core of this innovation, OCSiAl's TUBALL nanotubes are incorporated directly into the graphite anodes of PowerCo's batteries. Here, they dramatically enhance both electrical conductivity and heat dissipation. The nanotubes establish a highly efficient, percolating conductive network throughout the anode material, significantly accelerating electron transport. This critical improvement allows batteries to sustain higher charging and discharging currents without incurring detrimental overheating, a common challenge in high-performance applications.

The benefits extend beyond mere current handling. Superior thermal management directly translates to enhanced battery safety, effectively mitigating the risk of thermal runaway, particularly during demanding rapid charging cycles. Furthermore, the improved charge performance and inherent thermal stability conferred by the nanotubes contribute to a significantly extended overall service life for the battery. Notably, TUBALL nanotubes offer a cost-effective solution, delivering substantial performance improvements with minimal additive concentrations to existing battery chemistries.

Strategically, this partnership has the potential to redefine benchmarks for EV battery technology. By leveraging TUBALL nanotubes within the 'Unified Cell' platform, future Volkswagen Group EVs are poised to offer faster charging, extended driving range, and superior safety. This successful deployment is anticipated to encourage broader adoption of advanced nanomaterial technologies across the automotive and battery manufacturing sectors, spurring further innovation. Crucially, the supply of TUBALL nanotubes will originate from OCSiAl's facility in Serbia, a move that strengthens the establishment of a vital and localized battery material supply chain within Europe, reducing geopolitical supply risks.

Source: https://ocsial.com/news/ocsial-to-supply-single-wall-carbon-nanotubes-to-powercos-salzgitter-facility/

Collected: June 26, 2026 | Automated Research System (Gemini API)

#13 China's Prinano Validates 8-Inch Photonic Chip Production with Nanoimprint Lithography, Challenging DUV and Canon at 1/10th Cost

Published Published June 20, 2026　複数の報道機関 (香港NTI、Semiconductor Engineering、Loano via YouTube)　China

OVERVIEW

Chinese startup Prinano Technology has announced the validation of volume production for 8-inch photonic chip wafers using its indigenously developed PL-AS vacuum pneumatic nanoimprint lithography machine. This innovative system achieves sub-2nm residual layer variation and sub-10nm features at a reported manufacturing cost one-tenth of traditional DUV lithography. Built entirely with domestic components, the breakthrough positions Prinano to challenge established international players like Canon, bolstering China's self-reliance in the critical semiconductor supply chain.

IN DEPTH

Background

The burgeoning demand for on-chip photonics, fueled by advancements in artificial intelligence (AI), necessitates faster data transfer with significantly reduced heat generation. While powerful, traditional Deep Ultraviolet (DUV) lithography faces increasing complexity and cost challenges for scalable photonic chip manufacturing. Nanoimprint lithography (NIL) has re-emerged as a compelling alternative, offering high resolution, lower cost, and a simpler process ideal for patterning intricate photonic structures.

Historically, the NIL equipment market has been dominated by a few international players, particularly Japan's Canon. Prinano's achievement represents a pivotal development in China's strategic drive for semiconductor self-sufficiency, aiming to reduce reliance on external technology and strengthen its domestic supply chain resilience.

Key Findings

Chinese startup Prinano Technology has announced the successful validation of volume production for 8-inch photonic chip wafers using its indigenously developed PL-AS vacuum pneumatic wafer-level nanoimprint lithography (NIL) machine. This innovative system bypasses conventional Deep Ultraviolet (DUV) lithography, reportedly reducing manufacturing costs to approximately one-tenth of traditional DUV-based solutions, while achieving sub-2nm residual layer variation and sub-10nm feature sizes. This represents a strategically significant breakthrough for China's semiconductor industry, challenging the long-standing dominance of international suppliers like ASML and Canon in high-end lithography.

Technical Details

- The Prinano PL-AS machine employs a proprietary vacuum air-cushion nanoimprint process, enabling highly uniform pressure distribution across the wafer and precise nanoscale pattern transfer.
- The system is claimed to achieve a residual layer variation of less than 2nm and feature sizes below 10nm, parameters critical for high-performance photonic devices where optical properties are intrinsically linked to physical geometry.

- Reported manufacturing cost reductions are substantial, estimated at approximately 90% compared to DUV lithography, positioning NIL as a highly cost-effective alternative.
- Furthermore, the lifespan of the imprint template is claimed to be five times longer than conventional methods, contributing to reduced consumable costs and improved production efficiency.
- The PL-AS is constructed with 100% domestically produced components, offering a robust solution against international tech sanctions and geopolitical supply chain risks, thereby bolstering China's technological self-reliance.
- Beyond photonic chips, the technology is expected to find applications in optical communication modules and optical interconnect devices, indicating broad potential.

Strategic Significance & Outlook

The successful volume production validation of Prinano's PL-AS machine signals China's potential to establish independent high-end semiconductor manufacturing capabilities, circumventing reliance on international giants. Widespread adoption of this technology could drastically lower the cost of photonic chips, accelerating innovation across optical communications, data centers, and AI hardware. However, independent verification of yields and production volumes will be crucial to ascertain its true market impact and commercial viability. Canon is also aggressively pursuing the commercialization of its nanoimprint technology, targeting high-volume manufacturing adoption by 2027, indicating intensifying competition in this critical sector.

Source: https://www.hknti.com/blog/9305/replacing-duv-china039s-first-domestic-nanoimprint-lithography-machine-enters-the-photonic-chip-arena

Collected: June 26, 2026 | Automated Research System (Gemini API)

#14 Beam Therapeutics Receives FDA IND Clearance for Liver-Targeted LNP Formulation BEAM-304 for Phenylketonuria (PKU) Treatment

Published June 18, 2026 Beam Therapeutics USA

OVERVIEW

Beam Therapeutics announced FDA IND clearance for BEAM-304, a liver-targeting lipid-nanoparticle (LNP) formulation of base editing reagents, for the treatment of Phenylketonuria (PKU). Designed to correct mutations in the phenylalanine hydroxylase (PAH) gene, BEAM-304 aims to restore PAH enzyme activity and reduce toxic Phe levels, potentially allowing for diet normalization. A Phase 1/2 trial will evaluate its safety, tolerability, and efficacy in reducing blood Phe levels and liberalizing diet in PKU patients.

IN DEPTH

Key Findings

Beam Therapeutics has received Investigational New Drug (IND) application clearance from the U.S. Food and Drug Administration (FDA) for BEAM-304, a liver-targeting lipid-nanoparticle (LNP) formulation of base editing reagents. This significant milestone enables the initiation of a Phase 1/2 clinical trial for BEAM-304, which is designed to provide a potentially transformative, single-administration treatment for Phenylketonuria (PKU).

Technical / Clinical Details

- BEAM-304 utilizes an advanced LNP system to precisely deliver base editing reagents specifically to liver cells, where the phenylalanine hydroxylase (PAH) enzyme is primarily expressed.
- The therapeutic mechanism involves correcting the underlying genetic mutations in the PAH gene, which are responsible for PKU. By restoring functional PAH enzyme activity, BEAM-304 aims to significantly reduce the accumulation of toxic phenylalanine (Phe) in the blood.
- For PKU patients, who currently face lifelong, stringent dietary restrictions, BEAM-304 offers the potential to liberalize their diet and ultimately normalize their metabolic function.
- The upcoming Phase 1/2 clinical trial will assess the safety, tolerability, and pharmacodynamic efficacy of BEAM-304, focusing on its ability to lower blood Phe levels and facilitate dietary liberalization in affected patients.
- The LNP technology is crucial for efficient *in vivo* delivery of gene-editing tools, and Beam's liver-targeting formulation represents a sophisticated application of this platform for genetic disorders.

Background & Context

Phenylketonuria (PKU) is a rare genetic metabolic disorder caused by mutations in the PAH gene, leading to the accumulation of phenylalanine, which can cause severe neurological damage if untreated. Current management primarily relies on strict dietary control, placing a substantial burden on patients and their families. Gene editing technologies, particularly *in vivo* approaches, hold immense promise for curative interventions by addressing the root cause of such genetic diseases.

Beam Therapeutics is a pioneer in base editing, a precise form of gene editing that chemically modifies a single base in the DNA without creating double-strand breaks. This IND clearance expands the potential clinical application of their platform for single-base correction in genetic diseases. The advancements in LNP technology, demonstrated prominently by mRNA vaccines, have been pivotal in enabling the systemic delivery of gene therapies.

Strategic Significance & Outlook

The initiation of the BEAM-304 Phase 1/2 clinical trial is poised to usher in a new era for PKU treatment. If clinical studies confirm its safety and efficacy, BEAM-304 could offer a groundbreaking therapy that liberates PKU patients from their restrictive diets, fundamentally transforming their quality of life. This success could also pave the way for LNP-based *in vivo* gene editing to be applied to a broader spectrum of genetic disorders, having a profound impact across the entire gene therapy landscape.

Source: https://investors.beamtx.com/news-releases/news-release-details/beam-therapeutics-announces-clearance-investigational-new-drug-0/

Collected: June 26, 2026 | Automated Research System (Gemini API)

#15 Argo Graphene Solutions Closes License Agreement for Grapherry's STREAM Graphene Production Platform

Published June 25, 2026 Newsfile Corp. via StockTitan Canada

OVERVIEW

Argo Graphene Solutions Corp. has finalized a license agreement with Grapherry, Inc. for Grapherry's proprietary STREAM graphene production platform and related intellectual property. Grapherry, a U.S.-based company, focuses on developing and commercializing high-quality graphene from carbon-based feedstocks using scalable methods for industrial applications including construction, infrastructure, agriculture, and energy storage. The agreement involves the issuance of common shares to Grapherry upon Argo's completion of financing, commissioning of a graphene production facility, and achievement of revenue milestones.

IN DEPTH

Key Findings

Argo Graphene Solutions Corp. has successfully closed a significant license and technology transfer agreement with Grapherry, Inc. for Grapherry's proprietary STREAM graphene production platform and its associated intellectual property. This agreement is a pivotal step for Argo, enabling them to establish scalable, high-quality graphene manufacturing capabilities and accelerate commercialization across diverse industrial sectors.

Technical / Clinical Details

- The licensed Grapherry STREAM graphene production platform is a proprietary technology designed for the efficient and scalable manufacturing of high-quality graphene from carbon-based feedstocks.
- This technology is geared towards a broad range of industrial applications, including enhancing the strength of construction materials, improving the durability of infrastructure, boosting yields in the agricultural sector, and increasing the efficiency of energy storage solutions.
- Grapherry, based in the U.S., specializes in the development and commercialization of high-grade graphene.
- The agreement stipulates that Argo Graphene Solutions will issue common shares to Grapherry upon the achievement of specific milestones: the completion of financing, the commissioning of a graphene production facility, and the attainment of defined revenue targets.
- This structure fosters a long-term partnership, aligning the interests of both companies towards successful technology transfer and subsequent commercialization.

Background & Context

Graphene, often heralded as a "wonder material" due to its exceptional strength, electrical conductivity, and thermal properties, holds immense promise for various industrial applications. However, the challenge of mass-producing high-quality graphene efficiently and cost-effectively has been a significant hurdle to its widespread commercial adoption. Grapherry's STREAM platform is positioned as a potential solution to this critical manufacturing bottleneck.

Companies like Argo Graphene Solutions are actively seeking to acquire such advanced production technologies to enhance their competitive edge in the burgeoning graphene market and unlock new commercial opportunities. This agreement signifies a broader trend in the graphene industry, moving from pure research and development towards large-scale industrial commercialization.

Strategic Significance & Outlook

The integration of Grapherry's STREAM platform will significantly bolster Argo Graphene Solutions' capacity to deploy graphene-based products in sectors such as construction, infrastructure, agriculture, and energy storage. This technology transfer is expected to stabilize the supply of high-quality graphene and reduce production costs, thereby accelerating the development of new applications that adopt graphene as a mainstream material. The equity-based milestone structure underscores a strong commitment to long-term partnership and commercial success, making Argo's future endeavors worth watching in the advanced materials space.

Source: https://www.newsfilecorp.com/release/302811/Argo-Graphene-Solutions-Corp.-Announces-Closing-of-License-and-Technology-Transfer-Agreement-with-Grapherry-Inc.-and-Management-Update

Collected: June 26, 2026 | Automated Research System (Gemini API)

#16 Technion Scientists Halt Triple-Negative Breast Cancer in Mice with Drug-Free Nanoparticles

Published Published June 25, 2026　The Australian Jewish News (reprinting The Times of Israel)
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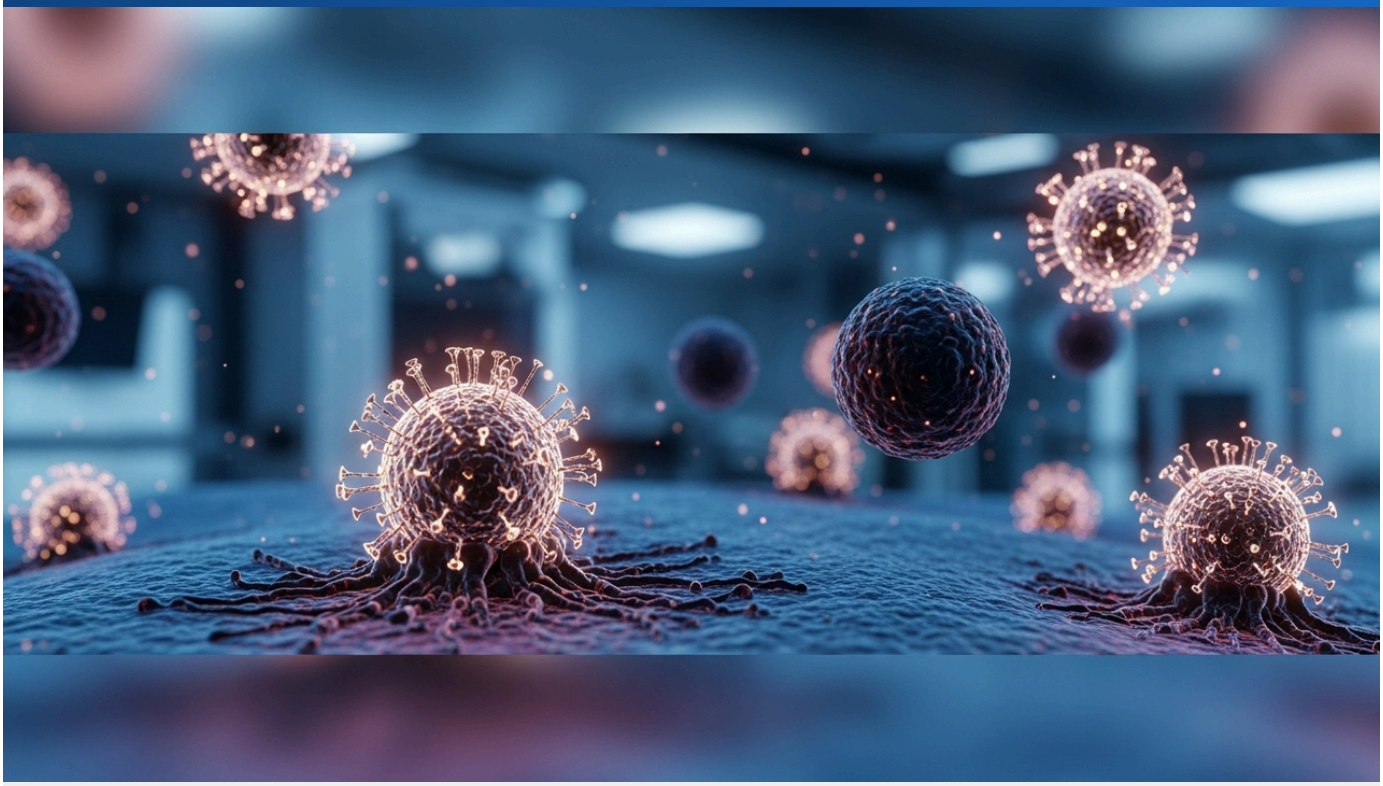


OVERVIEW

Scientists at the Technion-Israel Institute of Technology have developed novel nanoparticles that successfully halted aggressive triple-negative breast cancer (TNBC) tumors in female mice without using any drugs or chemotherapy. This groundbreaking drug-free approach achieved therapeutic outcomes comparable to advanced immunotherapies, offering a potential paradigm shift toward chemical-free treatments for this highly lethal disease. Published in *ACS Nano*, this research opens new avenues for nanomedicine in oncology.

IN DEPTH

The Challenge of Triple-Negative Breast Cancer

Triple-negative breast cancer (TNBC) stands as one of the most formidable challenges in oncology. Characterized by its lack of estrogen, progesterone, and HER2 receptor expression, TNBC limits targeted therapeutic options, often necessitating reliance on highly toxic chemotherapy regimens with significant side effects. Patients face high recurrence rates, aggressive metastatic potential, and a generally poor prognosis compared to other breast cancer subtypes. Consequently, there is an urgent and unmet medical need for more effective, less toxic, and chemical-free therapeutic alternatives. Nanomedicine has emerged as a promising frontier in drug delivery, diagnostics, and therapy, with drug-free approaches offering substantial advantages in reducing systemic toxicity and minimizing adverse effects.

A Drug-Free Nanoparticle Breakthrough

A team of scientists at the Technion-Israel Institute of Technology has engineered novel nanoparticles that have successfully halted the proliferation of aggressive TNBC tumors in female mice. Critically, this breakthrough was achieved without the use of chemotherapy or any other pharmacological agents, presenting a truly drug-free nanomedicine approach. The therapeutic outcomes demonstrated by these nanoparticles were found to be comparable to those achieved with advanced immunotherapy treatments, signifying a potential paradigm shift towards transformative, chemical-free therapies for this particularly lethal form of breast cancer.

Mechanism and Efficacy

- Unlike conventional nanomedicines that carry a drug payload, these nanoparticles exert their anti-tumor effects through their intrinsic physical properties and specific biological interactions within the tumor microenvironment. The precise mechanism is believed to involve selective accumulation within the tumor, interfering with cancer cell proliferation signaling pathways, or inducing apoptosis (programmed cell death).
- In robust preclinical models using female mice, treatment with these nanoparticles significantly suppressed tumor size and growth rate in triple-negative breast cancer, often leading to a complete cessation of tumor progression.

- The therapeutic results demonstrate efficacy on par with advanced immunotherapies, whether currently in clinical use or under development. A crucial advantage observed in the safety profile was the complete absence of drug-related side effects.
- Given TNBC's inherent resistance to many targeted therapies due to its receptor-negative status, these nanoparticles offer a potential new therapeutic strategy that operates independently of these traditional targets.
- The scientific rigor and significance of these findings have been validated through their publication in the prestigious scientific journal *ACS Nano*.

Strategic Significance and Outlook

This groundbreaking nanoparticle technology holds immense promise for revolutionizing the treatment landscape for triple-negative breast cancer. While the success in mouse models represents an early, preclinical stage, progression to human clinical trials, if successful, could offer a beacon of hope for countless patients desperately seeking effective, less toxic, and chemical-free treatment options. Researchers are also anticipating exploring the applicability of this innovative approach to other intractable cancer types. This study powerfully exemplifies how the strategic application of nanotechnology can profoundly shape and advance the future of cancer therapy, moving beyond traditional drug-dependent paradigms.

Source: https://www.australianjewishnews.com/israeli-drug-free-nanomedicine-breakthrough/

Collected: June 26, 2026 | Automated Research System (Gemini API)

#17 Labcorp Strengthens Lipid Nanoparticle (LNP) Development as Non-Viral Vectors for Vaccine and Cell/Gene Therapy

Published June 23, 2026 Labcorp USA

OVERVIEW

Labcorp is emphasizing the crucial role of lipid nanoparticles (LNPs) as effective non-viral vectors for nucleic acid delivery in vaccines, cancer therapies, and cell and gene therapies. A key industry challenge is developing novel LNPs with sufficient safety and stability, alongside scalable preparation methods for clinical and commercial use. Labcorp's Biopharmaceutical CMC GMP R&D team has successfully developed LNP formulations for various applications, including encapsulating self-amplifying mRNA and delivering Cas9-mRNA for gene editing, demonstrating successful protein expression.

IN DEPTH

Key Findings

Labcorp is highlighting its intensified focus on the development of lipid nanoparticles (LNPs) as effective non-viral vectors for nucleic acid delivery in the burgeoning fields of vaccines, oncology, and cell and gene therapies. The company's Biopharmaceutical CMC GMP R&D team has made significant strides in developing LNP formulations with enhanced safety and stability, alongside establishing scalable preparation methods for both clinical and commercial applications.

Technical / Clinical Details

- LNPs serve as crucial non-viral delivery systems for efficiently transporting nucleic acid molecules such as mRNA, siRNA, and Cas9-mRNA into target cells, potentially circumventing the immunogenicity and manufacturing complexities associated with traditional viral vectors.
- Labcorp's team has developed diverse LNP formulations, capable of encapsulating self-amplifying mRNA for next-generation vaccines and delivering Cas9-mRNA for precise gene editing applications.
- These LNP formulations have demonstrated successful protein expression within cells, validating their functional efficacy in delivering genetic cargo.
- A central industry challenge involves creating novel LNPs with robust safety profiles and long-term stability, coupled with scalable manufacturing processes suitable for both clinical trials and commercial production. Labcorp is positioning its expertise to directly address these critical needs.
- Through GMP (Good Manufacturing Practice) compliant research and development, Labcorp aims to offer end-to-end LNP manufacturing solutions, from early-stage clinical development to full commercial scale.

Background & Context

Following the unprecedented success of mRNA vaccines during the COVID-19 pandemic, LNPs have emerged as one of the most promising delivery technologies in the gene and cell therapy landscape. Especially for *in vivo* gene editing and regenerative medicine, the ability to precisely and safely deliver nucleic acids to specific organs or cell types is paramount to maximizing therapeutic effect and minimizing off-target side effects.

While many pharmaceutical and biotechnology companies are working to optimize LNP technology, the inherent complexity of their composition and manufacturing processes presents significant technical hurdles. The specialized expertise offered by Contract Research Organizations (CROs) like Labcorp in this domain is crucial for accelerating the development of novel LNP-based therapeutics.

Strategic Significance & Outlook

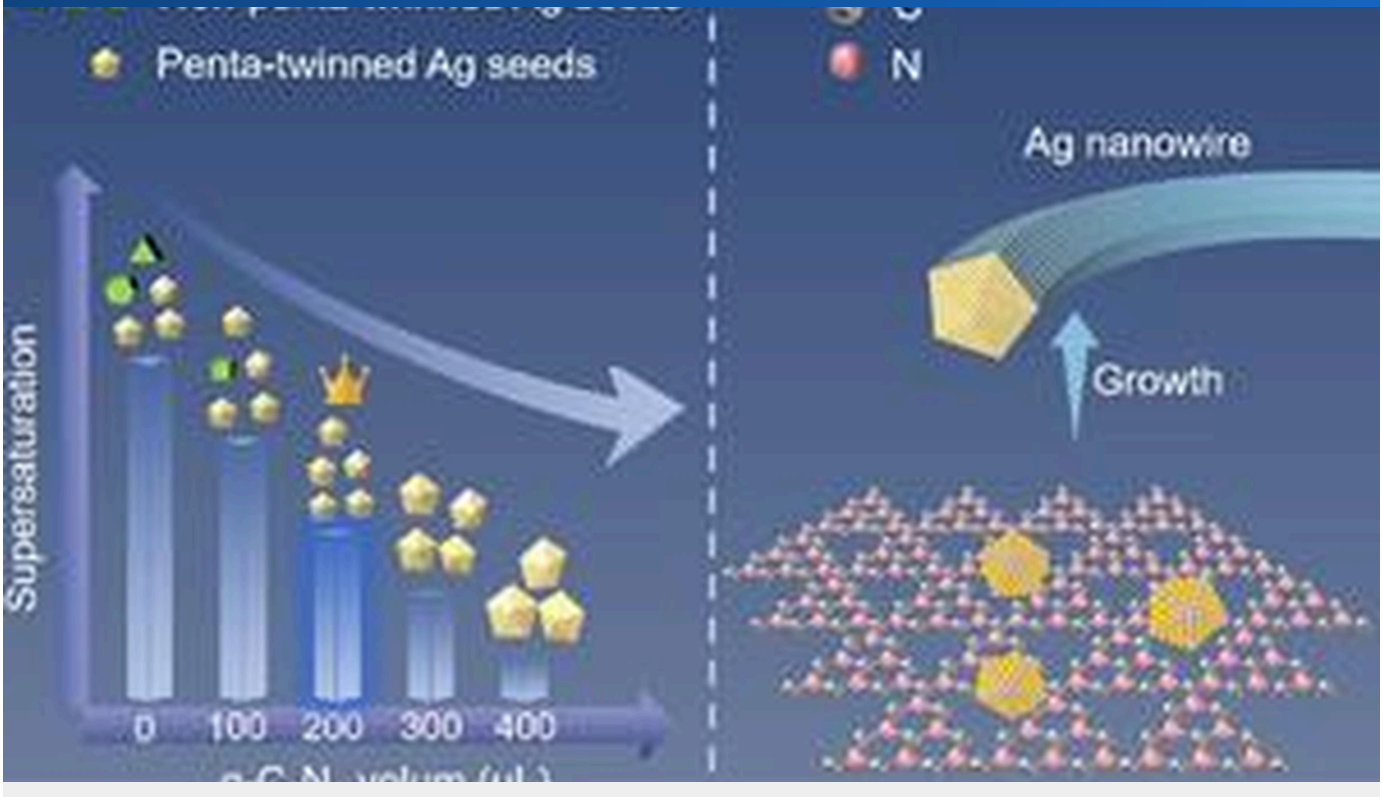
Labcorp's intensified LNP formulation development capabilities will provide essential services for the rapid market entry of next-generation vaccines, gene-editing therapies, and cell therapies. Advances in LNP safety, stability, and scalability will enable the realization of innovative treatments for a broader range of diseases, further expanding the frontiers of drug development. Labcorp's expertise is expected to play a vital role in helping numerous companies advance their LNP-based pipelines into and through clinical stages.

Source: https://www.labcorp.com/education-events/articles/formulation-development-lipid-nanoparticles-non-viral-vector-vaccine-and-cell-and-gene-therapy

Collected: June 26, 2026 | Automated Research System (Gemini API)

#18 Chinese Researchers Achieve Efficient Synthesis of Ultra-Long, High-Yield Silver Nanowires, Accelerating Transparent Conductor Applications

Published June 23, 2026 EurekAlert! (Hunan University and Xiamen University, China) China



OVERVIEW

Researchers at Hunan University and Xiamen University in China have developed a supersaturation modulation strategy for the efficient synthesis of ultra-long, high-yield silver (Ag) nanowires for transparent conductors. By adding 2D materials like g-C_3N_4 and MoS_2 to the reaction, they achieved in-situ formation of high-purity penta-twinned Ag seeds, leading to Ag nanowires with an average length exceeding 227 µm, an aspect ratio over 2200, and a 93% yield. This breakthrough, published in *Nano Research*, offers a theory-driven phase for large-scale synthesis of high-quality Ag nanowires.

IN DEPTH

Key Findings

A research team from Hunan University and Xiamen University in China has developed a novel supersaturation modulation strategy for the efficient synthesis of ultra-long, high-yield silver (Ag) nanowires (AgNWs), ideally suited for transparent conductor applications. This groundbreaking method enables the production of exceptionally high-quality AgNWs with an average length exceeding 227 micrometers, an aspect ratio greater than 2200, and an impressive yield of 93%. This discovery marks a significant advance in theory-driven synthesis within nanomaterials science.

Technical / Clinical Details

- The research team employed a unique supersaturation modulation strategy involving the addition of 2D materials, specifically g-C_3N_4 (graphitic carbon nitride) and MoS_2 (molybdenum disulfide), to the reaction solution.
- The inclusion of these 2D materials was found to facilitate the efficient *in-situ* formation of high-purity penta-twinned silver seeds within the solution. This penta-twinned structure is critical for promoting the anisotropic growth of AgNWs into long, rod-like structures and ensuring their single-crystallinity.
- Under optimized conditions, the synthesized AgNWs achieved an extraordinary average length exceeding 227 µm, significantly surpassing many existing synthesis methods.
- The aspect ratio (ratio of length to diameter) also exceeded 2200, providing a crucial advantage for achieving low sheet resistance while maintaining high optical transparency when used in transparent conductive films.
- Furthermore, the synthesis achieved a high yield of 93%, indicating excellent efficiency and suggesting potential for scalable mass production.
- The research findings have been published in the esteemed international academic journal *Nano Research*, confirming their scientific validity and impact.

Background & Context

Silver nanowires have garnered considerable attention as a promising alternative to Indium Tin Oxide (ITO) for transparent conductive materials, given their high electrical conductivity, excellent optical transparency, and flexibility. Applications span touchscreens, flexible displays, OLED lighting, and solar cells. However, previous challenges in AgNWs synthesis have included achieving uniform length, high yield, and managing cost and complexity at large-scale production.

This study provides a theory-driven synthesis strategy to overcome these long-standing challenges, potentially significantly accelerating the adoption of AgNWs in the transparent conductor market.

Strategic Significance & Outlook

The development of this efficient method for synthesizing ultra-long, high-yield AgNWs is set to have a substantial impact on the transparent conductor market. A stable supply of more affordable and higher-quality AgNWs will accelerate the development of next-generation display and sensor technologies, including flexible electronics, wearable devices, and IoT devices. If scalability for mass production is confirmed, this could contribute to building new industrial ecosystems independent of ITO, potentially unlocking billions of dollars in market opportunities for related industries. This breakthrough is a prime example of how nanotechnology can transform fundamental technologies in modern society.

Source: https://www.eurekalert.org/news-releases/1133514

#19 Canon Sets 25% Industrial Unit Profit Margin Target by FY2030, Focusing on Nanoimprint Technology Commercialization

Published June 24, 2026 Investing.com Canada (citing Nikkei online) Japan

OVERVIEW

Canon's CFO, Minoru Tanaka, announced a target to increase the operating profit margin of its industrial business to 25% by fiscal year 2030, up from 17.5% in 2026. This ambitious goal will be primarily driven by expanded sales of ArF dry equipment and the strategic leveraging of its nanoimprint lithography technology. Canon's nanoimprint technology is currently undergoing evaluation for high-volume manufacturing (HVM) adoption in 2027 and is also being developed for applications in optical-electrical convergence and wafer planarization.

IN DEPTH

Key Findings

Canon's CFO, Minoru Tanaka, has articulated an aggressive target to boost the operating profit margin of its industrial business segment to 25% by fiscal year 2030, a significant increase from 17.5% in 2026. This ambitious objective is predicated on expanding sales of ArF immersion lithography equipment and, crucially, the successful commercialization and broad adoption of Canon's advanced nanoimprint lithography technology.

Technical / Clinical Details

- Canon aims to solidify and expand its market share in the semiconductor manufacturing equipment sector through the continued provision of its ArF immersion lithography tools.
- The company's nanoimprint lithography technology is currently undergoing active customer evaluation for potential adoption in high-volume manufacturing (HVM) by 2027. This evaluation phase is critical for validating the technology's readiness for large-scale production environments.
- Nanoimprint technology is characterized by its ability to transfer extremely fine patterns with high precision, offering a potentially lower-cost and simpler process compared to traditional photolithography. It is particularly well-suited for devices requiring repetitive patterning.
- Beyond conventional semiconductor fabrication, this technology is also being developed for novel applications such as opto-electrical convergence devices (next-generation devices integrating optical and electrical signals) and wafer planarization, critical for ensuring uniform surfaces in advanced wafer processing. These areas represent significant growth drivers for the future electronics industry.

Background & Context

The semiconductor manufacturing equipment market is intensely competitive, with a continuous demand for smaller feature sizes, reduced manufacturing costs, and increased efficiency. Canon, with its long history in lithography technology, strategically focuses on DUV lithography and nanoimprint technology, particularly in the absence of an EUV lithography offering like ASML's. Nanoimprint technology holds promise for reducing patterning costs and simplifying processes, especially for specific applications like photonics and memory, where it could serve as an alternative or complementary technology to EUV.

The recent emergence of new players like China's Prinano Technology, asserting low cost and high performance in the nanoimprint market, underscores the strategic importance of Canon's early HVM adoption and expansion into new application areas to maintain its market leadership.

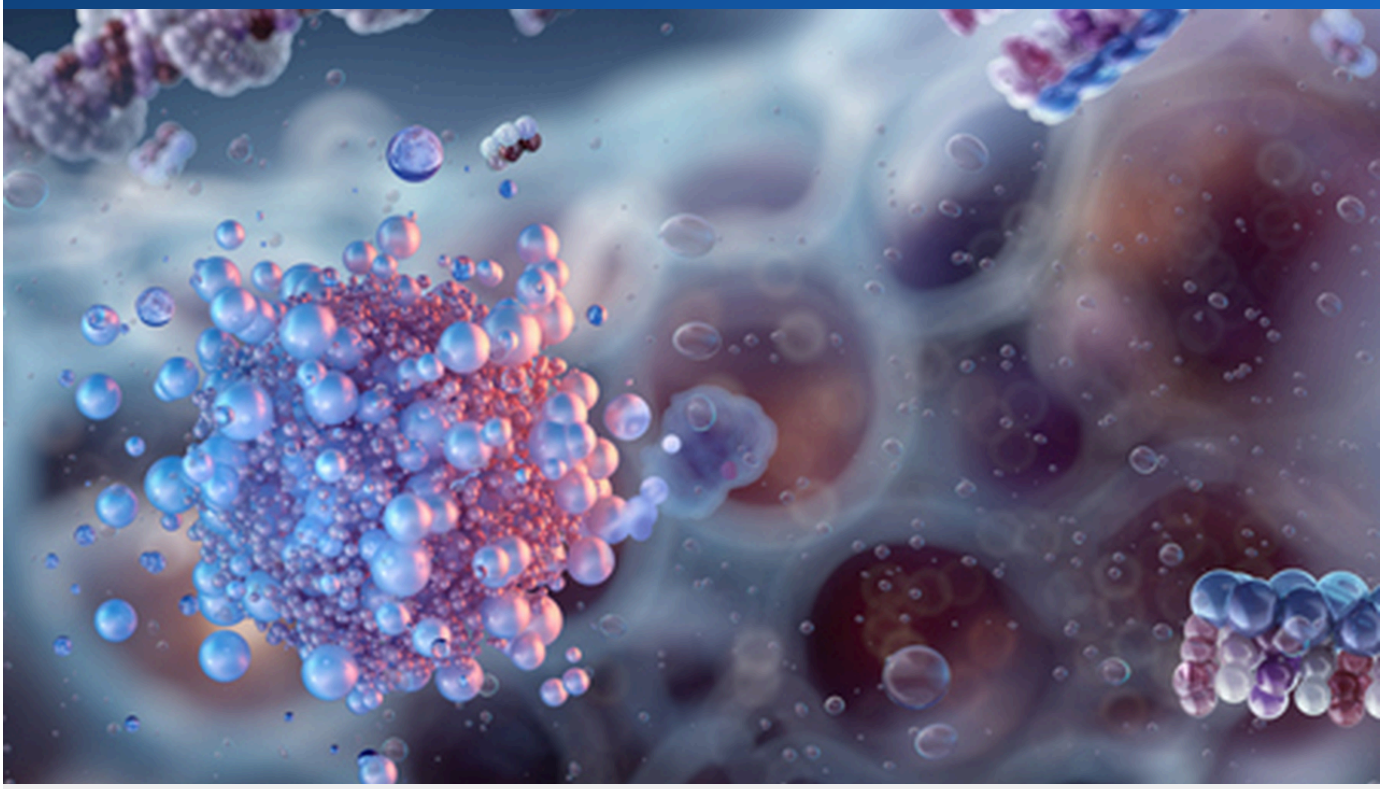
Strategic Significance & Outlook

Achieving Canon's 25% operating profit margin target for its industrial business by 2030 will heavily depend on the successful HVM adoption of its nanoimprint technology. If the 2027 HVM target is met, Canon could significantly strengthen its presence in the semiconductor manufacturing equipment market, securing a competitive edge, especially in emerging markets and specialized applications. Furthermore, development in high-growth areas like opto-electrical convergence and wafer planarization is expected to become a long-term revenue driver, supporting the sustainable growth of Canon's industrial business. This strategic direction reinforces the continued global impact of Japanese technology in the high-tech industry.

Source: https://ca.investing.com/news/stock-market-news/canon-cfo-sets-25-profit-margin-target-for-industrial-unit-93CH-4704848

#20 Cytiva Advances Extrahepatic mRNA-LNP Delivery to Spleen for In Vivo CAR Therapeutics

Published Published June 25, 2026　Cytiva　スウェーデン



OVERVIEW

Cytiva is making significant strides in *in vivo* CAR-T therapy by utilizing advanced lipid nanoparticle (LNP) systems for direct T cell reprogramming within patients. This innovative approach extends LNP delivery beyond the traditional liver targeting to lymphoid organs like the spleen, a key site for immune activity. This breakthrough promises a more efficient, scalable, and accessible alternative to complex *ex vivo* CAR-T manufacturing, potentially transforming the landscape of immunotherapy.

IN DEPTH

Background & Context

CAR-T cell therapy has demonstrated remarkable efficacy against specific cancer types, yet its widespread adoption is hampered by complex manufacturing processes, high costs, and lengthy lead times for patient administration. *In vivo* CAR-T therapy is gaining significant traction as a next-generation approach designed to overcome these barriers and make CAR-T therapy accessible to a broader patient population.

LNP technology has proven its immense power as a gene delivery platform, notably through the success of mRNA vaccines. Applying this technology to *in vivo* CAR-T therapy and achieving specific delivery to extrahepatic lymphoid organs represents a dual breakthrough in both gene therapy and immunotherapy fields.

Key Findings

Cytiva is making significant advancements in *in vivo* CAR-T therapy, utilizing lipid nanoparticle (LNP) systems to directly reprogram T cells within the patient. This innovative approach extends LNP delivery beyond the traditional liver targeting to lymphoid organs such as the spleen, where immune activity is highly concentrated. This development opens new avenues for efficient and scalable immunotherapy, offering a streamlined alternative to complex *ex vivo* CAR-T manufacturing processes.

Technical/Clinical Details

- The *in vivo* CAR-T therapy strategy aims to circumvent the elaborate *ex vivo* process—where T cells are extracted, genetically modified, expanded, and then reinfused—by directly targeting and reprogramming T cells within the patient's body.
- LNP systems are central to this approach, acting as safe and efficient carriers for delivering genetic material, such as mRNA, into target cells.
- Cytiva's research has focused on optimizing LNP design to improve delivery specificity, allowing for targeted delivery to lymphoid organs like the spleen. The spleen is an ideal site for *in vivo* CAR-T cell generation due to its rich T cell population and central role in immune responses.
- Enhanced specificity of LNP delivery to various splenic cell types, including T cells, is expected to enable more precise and controlled T cell reprogramming.

- This method has the potential to substantially reduce the time, cost, and logistical challenges associated with conventional *ex vivo* CAR-T cell manufacturing.

Strategic Significance & Outlook

The advancement in efficient extrahepatic delivery of mRNA-LNPs to the spleen is critically important for realizing *in vivo* CAR-T therapy. If this technology is further refined and demonstrates safety and efficacy in clinical trials, CAR-T therapy could become more accessible and cost-effective, expanding its reach to a wider patient population. Furthermore, this approach holds the potential for broader application in other *in vivo* gene editing and immunomodulatory therapies, fundamentally reshaping the future of genetic medicine. Contributions from companies like Cytiva in innovating manufacturing processes are crucial for accelerating these advanced therapies to market.

Source: https://www.drugdiscoveryonline.com/doc/extrahepatic-delivery-of-mrna-lnp-to-spleen-towards-in-vivo-car-therapeutics-0001

Collected: June 26, 2026 | Automated Research System (Gemini API)

#21 Nanoremediation Revolutionizes Environmental Cleanup with Enhanced Pollutant Removal Efficiency

Published Published June 18, 2026 CymitQuimica スペイン

OVERVIEW

Nanoremediation is rapidly proving to be a superior method for pollutant removal from water, soil, and air, outperforming conventional remediation techniques. By harnessing the high surface area and specific reactivity of advanced nanomaterials—such as carbon-based structures for organic pollutants, metal oxides for heavy metals, and semiconductor nanoparticles for dye degradation—this technology offers a transformative solution for challenging environmental contamination.

IN DEPTH

Background

The escalating global challenges of water and soil contamination, driven by industrialization and population growth, have created an urgent demand for effective and sustainable remediation technologies. Traditional methods—such as activated carbon adsorption, coagulation-flocculation, and biological treatments—frequently encounter limitations, including restricted treatment efficiency, high operational costs, and the generation of secondary waste. Over the past few decades, nanotechnology has emerged through intensive research and development as a promising solution to these persistent challenges.

Key Findings

Nanoremediation technology is rapidly establishing itself as a highly efficient alternative for pollutant removal from contaminated environments, significantly outperforming conventional physicochemical and biological methods. This advanced approach leverages the unique properties of nanoscale materials to effectively remove, transform, or neutralize a broad spectrum of contaminants across various media, including water, soil, and air.

Technical Details

The efficacy of nanoremediation stems from nanomaterials characterized by their exceptional surface area and specific reactivity. Key examples include:

- **Carbon-based Nanomaterials (e.g., carbon nanotubes, graphene)**: Highly effective for adsorbing persistent organic pollutants such as antibiotics and phenols from wastewater, their porous structures and chemical stability enable efficient capture of a wide range of molecules.
- **Metal Oxide Nanoparticles (e.g., iron oxide, manganese oxide)**: Exhibiting superior adsorption capabilities, these nanoparticles are highly effective in removing heavy metal ions like arsenic, lead, and cadmium from water. They achieve this by strongly binding with heavy metals via surface functional groups, promoting their precipitation or immobilization.

- **Semiconductor Nanoparticles (e.g., titanium dioxide, zinc oxide)**: Functioning as photocatalysts, these materials facilitate the degradation of dyes and other organic pollutants. Under UV or visible light irradiation, they generate reactive oxygen species that convert contaminants into innocuous compounds.

Compared to traditional remediation methods, these nanomaterials offer faster action, require smaller quantities, and present a reduced risk of secondary pollution.

Strategic Significance & Outlook

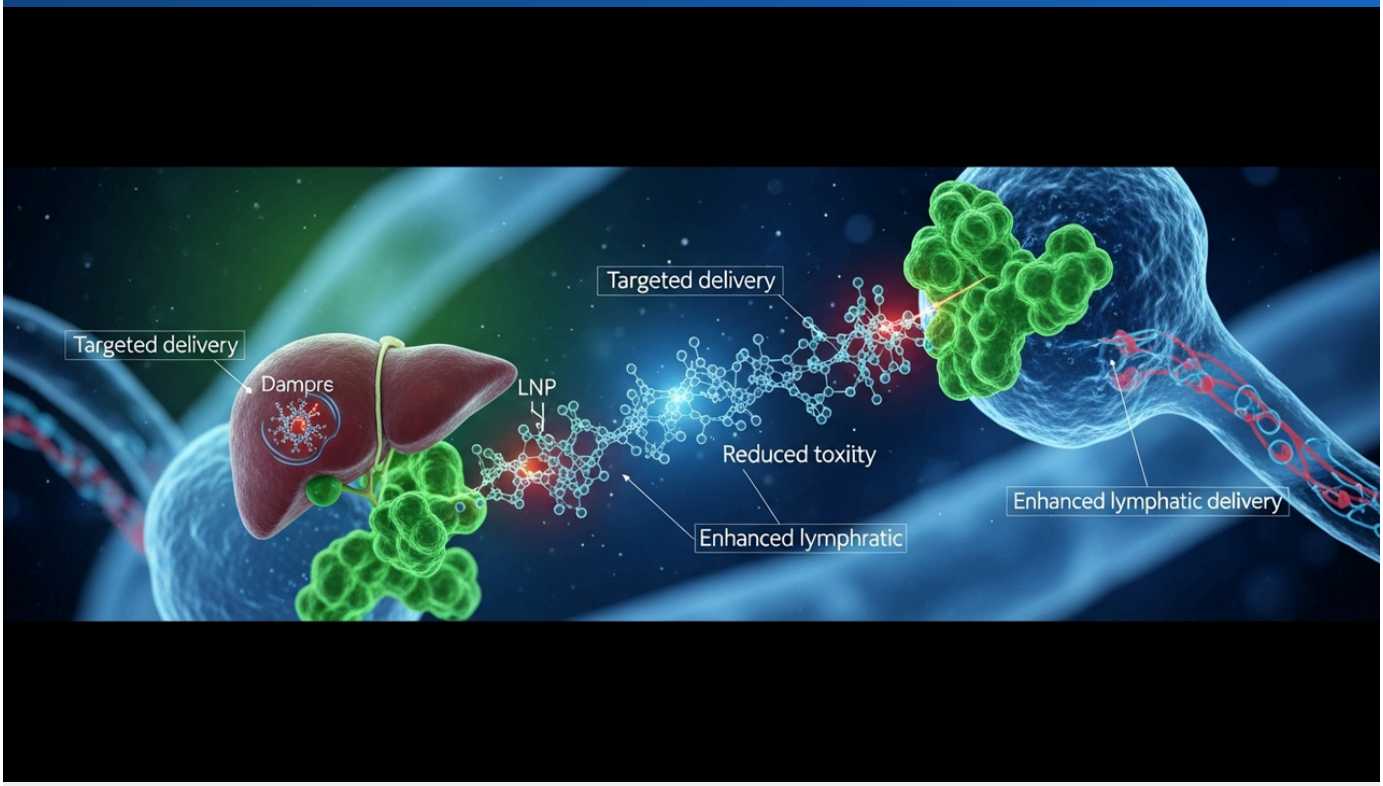
While nanoremediation technology represents a groundbreaking advancement in environmental cleanup, extensive further research is essential for its widespread practical implementation. Critical challenges include assessing the long-term environmental impact of nanomaterials, reducing manufacturing costs, ensuring scalability for large-scale deployment, and developing appropriate regulatory frameworks. Nevertheless, given its high efficiency and diverse applicability, nanoremediation is poised to become a cornerstone of future environmental technologies, playing a vital role in achieving smart pollution management and resource recovery globally.

Source: https://cymitquimica.com/news/262/nanoremediation-using-nanomaterials-to-clean-polluted-environments/

Collected: June 26, 2026 | Automated Research System (Gemini API)

#22 Albumin-Hitchhiking Lipid Nanoparticles Achieve 80% Liver Accumulation Reduction and 2-3x Lymphatic mRNA Expression

Published June 18, 2026 ACS Materials Au USA



OVERVIEW

A novel lipid nanoparticle (LNP) delivery concept has been developed to overcome the off-target liver accumulation and associated hepatotoxicity of mRNA therapeutics by interacting with endogenous albumin. This new LNP successfully reduced liver accumulation by approximately 80% while simultaneously increasing mRNA expression in lymph nodes by 2 to 3 times. This breakthrough significantly enhances the safety and targeting specificity of mRNA and nucleic acid-based therapies, paving the way for safer and smarter nanomedicine applications.

IN DEPTH

Key Findings

A groundbreaking lipid nanoparticle (LNP) concept has been introduced that leverages interaction with endogenous albumin to circumvent non-specific liver accumulation and enhance lymphatic delivery of mRNA and nucleic acid-based therapeutics. This innovation directly addresses the major clinical challenge of liver toxicity associated with conventional LNPs. The new LNP design has demonstrated an impressive approximately 80% reduction in liver accumulation, alongside a 2- to 3-fold increase in localized mRNA expression within lymph nodes.

Technical / Clinical Details

Traditional LNPs, following intravenous administration, are predominantly cleared by Kupffer cells in the liver, contributing to hepatotoxicity and systemic side effects. The newly developed LNP features a sophisticated surface modification designed to bind strongly with circulating endogenous albumin. Albumin, known for its long half-life and role as a transporter of various substances in the body, acts as a "hitchhiker," enabling the LNP to avoid direct hepatic uptake and promoting access to the lymphatic system. This mechanism facilitates efficient mRNA expression in lymph nodes, a desirable target for applications such as vaccines and immunotherapies. In mouse models, the research confirmed an approximately 80% suppression of LNP uptake by the liver, coupled with a 2 to 3 times increase in mRNA expression in the lymph nodes compared to conventional LNP formulations.

Background & Context

Since the monumental success of mRNA vaccines during the COVID-19 pandemic, mRNA technology has expanded beyond infectious disease vaccines to encompass broad therapeutic areas, including cancer immunotherapy, gene therapy, and regenerative medicine. However, the inherent instability and poor cellular membrane permeability of mRNA necessitate effective delivery systems like LNPs. While current LNP formulations exhibit high tropism for the liver, optimizing systemic delivery to other organs and tissues while minimizing side effects has been the next frontier. This novel albumin-mediated LNP design presents a paradigm-shifting solution to this critical challenge.

Strategic Significance & Outlook

This innovative LNP delivery strategy holds immense potential to significantly improve the safety profile and expand the therapeutic window of mRNA and nucleic acid-based medicines. It is particularly anticipated to enhance the efficacy of cancer vaccines and autoimmune disease therapeutics that specifically target lymph nodes. Future preclinical and clinical studies will further evaluate the long-term safety and efficacy of this LNP platform, marking a crucial step towards realizing safer and more effective next-generation nanomedicine products. By reducing off-target liver accumulation and enabling precise targeting of immune cells, this technology is also expected to contribute significantly to the advancement of personalized medicine.

Source: https://pubs.acs.org/doi/10.1021/acsmaterialsau.6c00068

#23 Nanotechnology-Based Drug Delivery Systems Drive Personalized Medicine with Approved Formulations for Diverse Diseases

Published June 25, 2026 IJSRT Journal India

OVERVIEW

Nanotechnology-based Drug Delivery Systems (NDDS) have overcome limitations of conventional therapies by enhancing drug solubility, absorption, stability, and bioavailability, enabling targeted delivery to specific tissues. Over the past two decades, multiple nanotechnology-based formulations for cancer, infectious diseases, and inflammatory conditions have received approval, significantly expanding their clinical impact. Despite regulatory complexities and scale-up challenges, NDDS are poised to spearhead the next generation of personalized medicine.

IN DEPTH

Key Findings

Nanotechnology-based Drug Delivery Systems (NDDS) have profoundly expanded their clinical impact over the past two decades, with numerous formulations approved for treating a variety of diseases including cancer, infectious diseases, and inflammatory conditions. These systems fundamentally improve core pharmacokinetic properties such as drug solubility, absorption, stability, and bioavailability, enabling targeted delivery to specific tissues or organs and thus overcoming many limitations of conventional therapeutic approaches.

Technical / Clinical Details

NDDS utilize various nanocarriers—such as liposomes, polymeric nanoparticles, micelles, and dendrimers—to encapsulate drugs or modify their surfaces. This approach leads to several significant improvements in drug performance:

- **Enhanced Solubility**: Dispersing poorly soluble drugs at the nanoscale dramatically increases their solubility within biological systems.
- **Improved Bioavailability**: Protecting drugs from degradation in the gastrointestinal tract and optimizing absorption pathways boosts their systemic circulation and utilization efficiency.
- **Increased Stability**: Drugs are shielded from oxidation and enzymatic degradation, enhancing the overall stability of the pharmaceutical formulation.
- **Targeted Delivery**: By functionalizing the nanocarrier surface with specific molecules (ligands), drugs can be selectively concentrated at diseased sites, such as cancer cells or inflamed tissues, thereby reducing off-target effects on healthy cells.

These capabilities maximize therapeutic efficacy and minimize adverse reactions, proving particularly valuable for highly toxic anticancer agents and biologicals requiring precise site-specific action.

Background & Context

Traditional drug therapies have long been challenged by non-specific action due to systemic administration, low bioavailability, and resultant side effects. The rapid advancements in nanotechnology in the 21st century have dramatically shifted the paradigm of drug delivery, giving rise to the new field of nanomedicine. Many pharmaceutical and biotechnology companies have invested heavily in NDDS development, with approved products now constituting a multi-billion-dollar market. Regulatory bodies are also actively developing guidelines for evaluating these innovative formulations.

Strategic Significance & Outlook

NDDS are expected to play a pivotal role in advancing personalized medicine. As applications increasingly tailor treatments based on individual patient genetic information and disease characteristics, significant improvements in treatment outcomes and quality of life are anticipated. However, widespread adoption necessitates overcoming challenges related to the complexity of quality control in manufacturing scale-up, generating long-term safety data, and improving cost-effectiveness. The integration of AI and machine learning for nanocarrier design optimization and the implementation of real-time quality monitoring technologies will be key to future developments.

Source: https://www.ijsrtjournal.com/article/nanotechnology-based-drug-delivery-systems-quality-by-design-approaches-and-regulatory-perspectives

#24 Anodyne Nanotech Raises $12.6 Million Series A to Advance Once-Weekly GLP-1 Patch ANN-101 into Phase I Clinical Trials

Published June 24, 2026 BioSpace USA

OVERVIEW

Anodyne Nanotech Inc., a clinical-stage biotechnology company, has secured $12.6 million in Series A funding to propel its once-weekly GLP-1 patch, ANN-101, for obesity treatment into Phase I clinical trials. The company's HeroPatch™ platform utilizes solid microneedle technology, enabling effective, room-temperature stable delivery of large molecules like GLP-1 without injection or refrigeration. This capital injection will support ANN-101's clinical development, accelerate the transdermal delivery platform, scale up manufacturing, and expand strategic partnership initiatives.

IN DEPTH

Key Findings

Anodyne Nanotech Inc., a clinical-stage biotechnology company, has successfully completed a $12.6 million Series A funding round to accelerate its Phase I clinical trial for ANN-101, a once-weekly GLP-1 patch designed for obesity treatment. This significant funding marks a crucial step in advancing the company's innovative HeroPatch™ transdermal delivery platform, addressing substantial unmet needs in chronic disease management.

Technical / Clinical Details

Anodyne Nanotech's HeroPatch™ platform is built upon solid microneedle technology, differentiating it from traditional injectable formulations. This patch facilitates the effective transdermal delivery of relatively large peptide molecules, such as GLP-1, without the need for a conventional needle injection. A key advantage is the patch's room-temperature stability, eliminating the requirement for cold chain storage and significantly improving patient convenience while reducing storage and distribution costs. The simplicity of once-weekly administration is expected to enhance treatment adherence among patients with obesity. The recently secured funding will establish the foundation to advance ANN-101's Phase I clinical trials as planned, evaluating its safety and pharmacokinetic profile. The company positions this platform as a technology with the potential to revolutionize diabetes and obesity treatment.

Background & Context

GLP-1 receptor agonists have gained widespread recognition for their efficacy in treating type 2 diabetes and obesity, leading to rapid market expansion in recent years. However, many of these drugs require weekly or daily injections, which can be burdensome for patients. Furthermore, like many biologics, they necessitate refrigerated storage, posing challenges for maintaining the cold chain during distribution. Anodyne Nanotech's transdermal patch offers a potential solution to these existing GLP-1 therapy challenges, aiming to reduce patient burden and provide a more accessible treatment option. This represents a critical advancement in promoting patient-centric treatment approaches for large-scale chronic disease management.

Strategic Significance & Outlook

The $12.6 million raised will primarily fund the execution of ANN-101's Phase I clinical trials. Additionally, the capital will be utilized to accelerate the HeroPatch™ transdermal delivery platform's technological development, scale up manufacturing capabilities, and expand future strategic partnership activities. Anodyne Nanotech plans to apply this platform to other large molecules and chronic disease therapeutics, beginning with ANN-101, potentially transforming drug delivery standards in the pharmaceutical industry. As clinical development progresses, the commercial value of this innovative technology is expected to further increase.

Source: https://www.biospace.com/press-releases/anodyne-nanotech-closed-a-12-6-million-series-a-to-advance-once-weekly-glp-1-patch-into-phase-i-clinical-trials

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#25 Tin Oxide Quantum Dot Layer Boosts Perovskite Solar Cell Efficiency to 25.7% with Enhanced Stability

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OVERVIEW

New research introduces a tin oxide quantum dot (QD) layer as an electron transport layer to significantly improve the stability and power conversion efficiency of perovskite solar cells. This QD layer enhances light capture and reduces undesirable inter-layer reactions, resulting in a high conversion efficiency of 25.7%, comparable to existing records. This breakthrough is a critical step towards the commercialization of next-generation solar cells, contributing to more efficient and stable renewable energy sources.

IN DEPTH

Key Findings

A novel technique has been unveiled that dramatically enhances the stability and power conversion efficiency of perovskite solar cells. By integrating a tin oxide (SnO_2) quantum dot (QD) layer as the electron transport layer, researchers have achieved a remarkable 25.7% conversion efficiency, a figure that rivals existing world records. This innovative approach effectively suppresses inter-layer reactions, a primary cause of solar cell performance degradation, and significantly boosts light-harvesting capabilities.

Technical / Clinical Details

Perovskite solar cells are garnering significant attention as a next-generation photovoltaic technology due to their high efficiency potential and low manufacturing costs. However, improving their long-term stability and further enhancing efficiency have remained key challenges. The reported research addresses these issues by adopting a strategy where SnO_2 QDs are used in place of conventional materials for the electron transport layer. SnO_2 QDs contribute to enhanced photovoltaic device performance owing to their excellent electron mobility and wide bandgap properties.

- **Improved Light Harvesting**: The unique quantum effects of quantum dots enable more efficient absorption of a broader spectrum of sunlight, thereby promoting photoelectric conversion.
- **Suppression of Interfacial Reactions**: The QD layer forms a stable interface between the perovskite and electron transport layers, effectively suppressing non-radiative recombination of charge carriers—a major cause of efficiency loss. This improves the overall stability of the device and delays performance degradation.
- **Achievement of 25.7% Efficiency**: The synergistic effect of these improvements has enabled the quantum dot-enhanced perovskite solar cell to achieve a power conversion efficiency of 25.7%, positioning it among the highest benchmarks in academic research globally. This performance is comparable to, or even surpasses, commercially available silicon-based solar cells.

This technology paves the way for the development of solar cells with higher energy yields and greater durability.

Background & Context

As the global transition to renewable energy accelerates, solar power remains one of the most critical energy sources. Perovskite solar cells are extensively researched as a promising alternative to silicon-based photovoltaics, given their low manufacturing costs and high theoretical efficiencies. However, poor stability, particularly against humidity and heat, has been a significant barrier to their practical implementation. The quantum dot-based interfacial engineering presented here offers a groundbreaking solution to this stability challenge, substantially increasing the commercial viability of perovskite solar cells.

Strategic Significance & Outlook

This research marks a significant milestone in the evolution of perovskite solar cell technology. The combination of high efficiency (25.7%) and improved stability is expected to accelerate their deployment across a wide range of applications, from large-scale solar farms to building-integrated photovoltaics (BIPV) and flexible solar cells. Future work will focus on integrating this quantum dot layer into large-scale manufacturing processes and validating long-term durability through extensive field testing. As this technology matures, it holds the potential to dramatically enhance the cost-effectiveness and sustainability of solar power, transforming the global energy landscape.

Source: https://news.metal.com/vn/newscontent/101736295-optimization-of-perovskite-photovoltaic-cells-more-stable-and-efficient-after-adding-a-layer-of-quantum-dots