Perovskite Solar

Weekly Intelligence Report

2026-06-07 | 25 articles | 8 countries

troy-technical.jp

This Week's Keyword

Perovskite Commercial

Efficiency records meet mass production push

25	8	35.2	907
articles	countries	%	W
Total Articles	Source Countries	Record Tandem Efficiency	Record Module Output

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	AIST Accelerates PSC	Corp Strategy	●●●○○	●●●○○	●●●○○	●●○○○	●●●○○	Japan's AIST targets 15-20 year perovskite lifespan and advanced manufacturing for early 2030s commercialization.
#02	U.S. DOE Invests $60M+	Govt Policy	●●○○○	●●○○○	●●●●	●●●○○	●●●●	U.S. DOE invests over $60M in perovskite R&D;, manufacturing, and validation to boost efficiency and stability.
#03	NUS & JinkoSolar 32.76%	Research Break	●●●●	●●●○○	●●●●	●●●●	●●●●	NUS & JinkoSolar achieve 32.76% certified efficiency in perovskite-silicon tandem cells with 91% stability after 1,700 hours.
#04	Industry Shifts Focus	Market Analysis	●○○○○	●●●●	●●●●	●●●○○	●●●●	Perovskite industry shifts focus from lab efficiency to mass production scalability, reliability, and manufacturing economics.
#05	Trina Solar 907W Module	Product Announce	●●●●	●●●●	●●●●	●●●●	●●●●	Trina Solar sets new record: 907W, 29.2% efficiency on 3.1m² perovskite/silicon tandem module, TÜV SÜD validated.
#06	IIT Guwahati 25.73%	Research Break	●●●●	●●○○○	●●●○○	●●●●	●●●○○	IIT Guwahati achieves 25.73% efficiency, 90% stability in perovskite solar cells via molecular interface engineering, also for memory.
#07	UNSW Martin Green 35.2%	Research Break	●●●●	●●○○○	●●●●	●●●●	●●●●	Prof. Martin Green (UNSW) achieves 35.2% tandem efficiency, establishes field test facility for perovskite durability.
#08	U.S. DOE & Kodak R2R	Mfg Innovation	●●●○○	●●●○○	●●●●	●●●○○	●●●●	U.S. DOE & Kodak use high-speed roll-to-roll printing for perovskite solar cells, targeting 4GW annual production and durability.
#09	arXiv Detector	Basic Research	●●●●	○○○○○	●●○○○	●●●●	●●○○○	arXiv paper details thin single-crystal perovskite detector for high-energy charged particles, promising real-time electron monitoring.
#10	Sekisui CapEx Risk	Corp Strategy	●○○○○	●●●●	●●○○○	●●○○○	●●●○○	Sekisui Chemical's perovskite solar cell program faces increased CapEx and execution risk amidst core business challenges.
#11	Halocell Grant Scale-Up	Corp Strategy	●●○○○	●●●○○	●●○○○	●●●○○	●●●○○	Halocell Energy secures Australian grant to scale perovskite PV production with roll-to-roll equipment for late 2020s market entry.
#12	Yingfa Ruineng 724W	Product Announce	●●●●	●●●●	●●●●	●●●●	●●●●	Yingfa Ruineng (China) achieves 26.78% efficiency, 724W output for large-format perovskite-BC tandem module (4T).

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#13	Sekisui Solafil Launch	Product Launch	●●●○	●●●●	●●●○	●●●○	●●●○	Sekisui Chemical launches 'Solafil' flexible perovskite solar cells, targeting 100MW production by 2027 with 20% efficiency, 20-year lifespan.
#14	Granholm Joins Tandem PV	Corp Strategy	●○○○	●●●●	●●●●	●●●○	●●●●	Former U.S. Energy Secretary Granholm joins Tandem PV board to accelerate perovskite-silicon tandem commercialization.
#15	U.S. DOE Targets	Govt Policy	●○○○	●●○○	●●●●	●●●○	●●●●	U.S. DOE SETO publishes performance targets for perovskite PV R&D;, guiding future funding for efficiency, stability, reproducibility.
#16	MDPI Ion Migration	Academic Review	●●●●	●○○○	●●●○	●●●●	●●●○	MDPI review shows 2D perovskites' long-chain organic ligands suppress ion migration, enhancing stability for long-term durability.
#17	U.S. DOE SETO Comp.	Govt Policy	●○○○	●●○○	●●●●	●●●○	●●●●	U.S. DOE SETO review targets perovskite cost reduction and domestic manufacturing expansion by 2025 for competitiveness.
#18	arXiv Nano-textures	Academic Review	●●●○	●○○○	●●●○	●●●●	●●○○	arXiv paper reviews nano/micro-textures enhancing perovskite solar cell wettability, crystallinity, charge extraction, and mechanical stability.
#19	JPSC Launch	Industry Alliance	●○○○	●●●●	●●●●	●●●○	●●●●	Five Japanese companies launch JPSC to accelerate perovskite solar cell adoption and strengthen global competitiveness.
#20	Chinese Mol. Sunscreen	Research Break	●●●●	●●○○	●●●○	●●●●	●●●○	Chinese researchers develop dynamic molecular sunscreen for perovskite solar cells, achieving 24.71% efficiency and 96.9% stability after 1000 hours by suppressing UV degradation.
#21	Chinese 33% Efficiency	Research Break	●●●●	●●○○	●●●●	●●●●	●●●●	Chinese researchers achieve 33% efficiency and 90% stability after 1000 hours in perovskite-silicon tandem cells, compatible with mass production.
#22	Kaneka FY2028 Launch	Corp Strategy	●●●○	●●●○	●●●○	●●●○	●●●○	Kaneka plans perovskite tandem solar cell product release by FY2028, leveraging NEDO fund for BIPV rooftop tile module demonstration.
#23	Tandem PV Ships T20	Product Launch	●●●●	●●●●	●●●●	●●●●	●●●●	Tandem PV secures $36M, funds 40MW demo plant, and ships U.S.-made T20 tandem modules, targeting >30% efficiency.
#24	Japan Deregulates PSC	Govt Policy	●○○○	●●●●	●●●●	●●●○	●●●●	Japanese government to deregulate perovskite solar cell installation by FY2026, clarifying BIPV design standards and easing regulations.
#25	GCL Perovskite SNEC	Product Announce	●●●●	●●●○	●●●●	●●○○	●●●●	GCL Perovskite announces 'dual record breakthrough' on large 2042cm² module at SNEC 2026, signaling mass production shift.

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

Three Questions That Demand Your Decision This Week

❶ Is your supply chain exposed to Asian dominance in perovskite manufacturing?

Chinese firms like Trina Solar, Yingfa Ruineng, and JinkoSolar are setting new records in large-format module efficiency and actively scaling production. Are your procurement strategies diversified enough to mitigate this emerging concentration?

❷ Does the 35.2% tandem efficiency make your current R&D; roadmap obsolete?

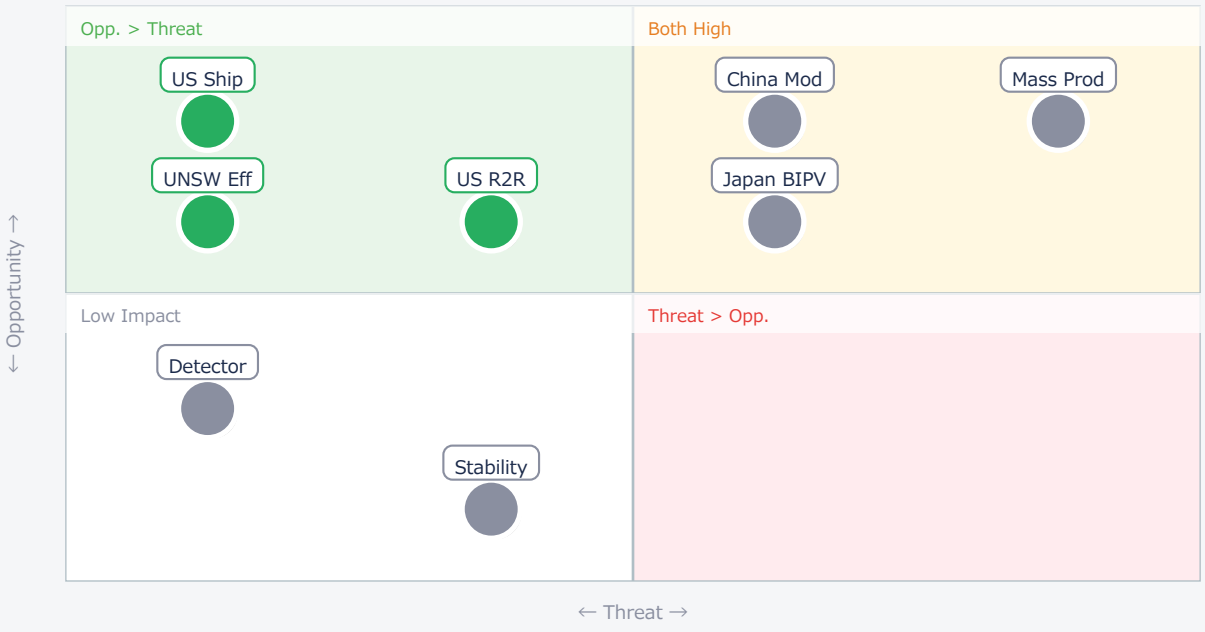
Professor Martin Green's team at UNSW achieved a new record of 35.2% efficiency for perovskite-on-silicon tandem cells. This, combined with significant stability improvements from Chinese researchers, sets a new bar. Is your R&D; keeping pace?

❸ Are you prepared for the BIPV market shift driven by flexible perovskites and deregulation?

Japanese companies (Sekisui Chemical, Kaneka) are launching flexible perovskite products for BIPV, supported by government deregulation. This opens new application areas. What is your strategy for this evolving market segment?

Opportunities vs. Threats for US/European Companies

Opportunity vs. Threat Matrix for US/European Companies



Item	Quadrant	↑ Opportunity	↓ Threat
● US Ship	Opp.	US market entry	—
● China Mod	Critical	Tech benchmark	Market dominance
● Mass Prod	Critical	New market	High CapEx
● US R2R	Opp.	Domestic supply	—
● Japan BIPV	Critical	New apps	Competitor lead
● UNSW Eff	Opp.	New tech base	—
● Detector	Ref.	Niche market	—

● Stability	Ref.	Longer life	—

Deep Dive ① — Tandem PV Ships U.S.-Made Modules

#23 | 2026/06/03 | Latitude Media | Tech Novelty●●●●○ Proximity●●●●● Market Impact●●●●○ Data Reliability●●●●○ US/EU Relevance●●●●●

Tandem PV, a US-based company, has secured $36M in Series A funding, fully funding a 40MW demonstration plant. Crucially, they have begun shipping U.S.-made T20 tandem modules to utility-scale customers, marking a significant transition from lab to commercialization.

The technology layers a proprietary perovskite film onto silicon solar cells, targeting efficiencies over 30%. This leverages existing silicon infrastructure and aims for high performance and durability, with long-term field validation underway.

▶ Strategic Analyst's Perspective

Strategic Analyst's Perspective: The immediate shipment of T20 modules by a US company is a strong signal of market readiness, exceeding typical expectations for perovskite commercialization. The 30%+ efficiency target is realistic given current research trends, but long-term durability in real-world utility conditions remains the key technical barrier. [Opportunity] for US/EU OEMs to integrate these high-efficiency modules and for materials suppliers to engage with a growing domestic supply chain. [Threat] for traditional silicon PV manufacturers if this technology scales rapidly and achieves cost parity. Next actions: [Procurement] Evaluate T20 module performance and supply chain stability this month. [R&D;] Benchmark Tandem PV's module-level performance against internal targets by next quarter. [Business Dev] Explore strategic partnerships for BIPV or specialized applications.

Deep Dive ② — Trina Solar's 907W Tandem Module Record

#05 | 2026/06/02 | EnergyTrend | Tech Novelty●●●●○ Proximity●●●●○ Market Impact●●●●○ Data Reliability●●●●○ US/EU Relevance●●●●○

Chinese PV giant Trina Solar announced a new world record: a 907W perovskite/crystalline silicon tandem solar module, achieving 29.2% full-area efficiency on an industry-standard 3.1m² size, validated by TÜV SÜD.

This breakthrough utilizes Trina Solar's 210mm large-size tandem cell technology, focusing on perovskite film uniformity, interface passivation, and spectral absorption. The use of a standardized industrial size indicates strong feasibility for mass application.

▶ Strategic Analyst's Perspective

Strategic Analyst's Perspective: Trina Solar's achievement is highly realistic and significant, as it's a module-level record on an industrial scale, validated by a reputable third party (TÜV SÜD). The technical barriers for mass production of such large-area, high-efficiency tandem modules are still substantial, particularly regarding uniform deposition and long-term stability under varied conditions. [Opportunity] for US/EU equipment manufacturers to supply advanced deposition and encapsulation tools. [Threat] for US/EU PV manufacturers facing intensified competition from Chinese firms setting new performance benchmarks for mass-market modules. Next actions: [R&D;] Analyze Trina Solar's technical approach for large-area uniformity and interface engineering by end of month. [Strategy] Assess the competitive landscape and potential market share shifts in utility-scale PV within the next quarter.

Deep Dive ③ — Prof. Martin Green Tackles Durability

#07 | 2026/06/05 | UNSW Sydney | Tech Novelty●●●●● Proximity●●○○○ Market Impact●●●●○ Data Reliability●●●●○ US/EU Relevance●●●●○

Professor Martin Green (UNSW), 'Father of Solar Cells,' is now focusing on perovskite durability. His team achieved a remarkable 35.2% efficiency for perovskite-on-silicon tandem cells, a new record reported in the International Solar Cell Efficiency Table.

UNSW plans to establish an independent field test facility to evaluate perovskite module durability under real-world conditions, aiming to validate reliability for commercialization, especially for the critical 25-year warranty period.

▶ Strategic Analyst's Perspective

Strategic Analyst's Perspective: Professor Green's 35.2% efficiency record is a significant academic breakthrough, pushing theoretical limits. However, the proximity to market for 25-year durability is still basic research, and the field test facility is a necessary but early step. The published numbers are likely lab-scale and need to be proven at module level. Technical barriers include scaling this efficiency to large areas and ensuring long-term stability in diverse climates. [Opportunity] for US/EU materials and encapsulation suppliers to partner with UNSW for advanced durability solutions. [Threat] for US/EU R&D; teams if they fall behind in fundamental efficiency and durability research. Next actions: [R&D;] Initiate collaboration discussions with leading academic institutions on perovskite durability and advanced characterization methods this month. [Strategy] Monitor UNSW's field test results closely for early indicators of long-term reliability within the next quarter.

Other Notable Articles

NUS & JinkoSolar Achieve 32.76% Certified Efficiency (AcademicJobs SG)
Tech Novelty●●●●○ Proximity●●●○○ Market Impact●●●●○

High certified efficiency (32.76%) and good stability (91% after 1,700 hrs) from Singapore/China collaboration sets a strong benchmark.

Perovskite Solar Industry Shifts Focus from Lab Efficiency to Mass Production Scalability (SolarVision)
Tech Novelty●○○○○ Proximity●●●●○ Market Impact●●●●●

The industry's shift to mass production, reliability, and economics is critical; US/EU firms must adapt their strategies now.

U.S. DOE and Kodak Advance Perovskite Solar Cell Manufacturing with High-Speed Roll-to-Roll Printing (U.S. Department of Energy (DOE))
Tech Novelty●●●○○ Proximity●●●○○ Market Impact●●●●○

Leveraging Kodak's R2R expertise for 4GW annual production is a significant US effort to scale manufacturing and reduce costs.

Chinese Researchers Achieve 33% Efficiency and 90% Stability After 1000 Hours in Perovskite-Silicon Tandem Solar Cells (CPG Click Petróleo e Gás | Solar Now)
Tech Novelty●●●●● Proximity●●○○○ Market Impact●●●●○

Another Chinese breakthrough: 33% efficiency with good stability, emphasizing compatibility with existing production lines, signals future market pressure.

Recommended Actions This Week

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

Immediate (this week)

- [Procurement] Identify and assess potential supply chain vulnerabilities to Asian perovskite module manufacturers (e.g., Trina Solar, Yingfa Ruineng).
- [R&D;] Conduct rapid internal review of current perovskite R&D; roadmaps against new 35%+ efficiency benchmarks from UNSW and Chinese research.
- [Executive] Schedule a strategic briefing on the implications of US-based Tandem PV's module shipments and Japanese BIPV market deregulation.

Short-term (1 month)

- [R&D;] Prioritize projects focused on long-term durability and stability, particularly against UV degradation, leveraging insights from molecular engineering and 2D perovskite research.
- [Business Dev] Initiate discussions with potential partners for flexible perovskite applications in BIPV, especially in markets with favorable regulatory environments like Japan.
- [Manufacturing] Evaluate the feasibility and cost-effectiveness of high-speed roll-to-roll manufacturing technologies for perovskite layers, considering US DOE/Kodak advancements.

Medium-long term (quarter+)

- [Strategy] Develop a comprehensive strategy for competing in or collaborating with the rapidly commercializing perovskite solar market, including IP licensing and joint ventures.
- [Legal/IP] Monitor international standardization efforts (e.g., JPSC) and regulatory changes to ensure future product compliance and market access.
- [R&D;] Invest in advanced characterization and field testing facilities to independently validate perovskite module performance and long-term reliability, similar to UNSW's initiative.

troy-technical.jp/en | Original curation. Article copyrights belong to respective authors. | Gemini API + Claude | 2026-06-07

PerovskiteSolarCells — Selected Articles

Date: 2026-06-07

Articles: 25

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#18 arXiv Paper Reviews Novel Advantages of Nano- and Micro-Textures for Multi-Faceted Performance Enhancement in Perovskite Solar Cells

#19 Five Major Japanese Companies Launch 'Japan Perovskite Solar Cell Promotion Council (JPSC)' to Accelerate Domestic Adoption and Strengthen International Competitiveness

#20 Chinese Researchers Develop Dynamic Molecular Sunscreen for Perovskite Solar Cells, Achieving 24.71% Efficiency and 96.9% Stability After 1000 Hours by Suppressing UV Degradation

#21 Chinese Researchers Achieve 33% Efficiency and 90% Stability After 1000 Hours in Perovskite-Silicon Tandem Solar Cells, Ensuring Compatibility with Mass Production Lines

#22 Kaneka Plans Perovskite Tandem Solar Cell Product Release by FY2028: Leveraging NEDO Green Innovation Fund for BIPV Rooftop Tile Module Demonstration

#23 Tandem PV Secures $36M, Fully Funds 40MW Demonstration Plant, and Begins Shipping U.S.-Made T20 Tandem Modules, Targeting Over 30% Efficiency

#24 Japanese Government to Deregulate Perovskite Solar Cell Installation by FY2026, Clarifying BIPV Design Standards and Easing Three Major Regulations

#25 SNEC 2026: GCL Perovskite Announces 'Dual Record Breakthrough' on 2042cm² Module, Signaling Accelerated Industry Shift Towards Mass Production

AIST Fast-Tracks Perovskite Solar Cells, Prioritizing Durability and Scalable Manufacturing

Published Published June 05, 2026 産業技術総合研究所 (AIST) Official YouTube Channel Japan

OVERVIEW

Japan's National Institute of Advanced Industrial Science and Technology (AIST) is significantly accelerating research and development into perovskite solar cells, backed by the government's Green Innovation Fund. The initiative critically focuses on enhancing device durability to achieve a practical 15-20 year lifespan and developing advanced, scalable manufacturing systems. This strategic push aims to foster collaborations and expedite the commercial deployment of next-generation solar technology.

IN DEPTH

Background

Perovskite solar cells are globally recognized as a highly promising next-generation photovoltaic technology, celebrated for their high power conversion efficiency, potential for low-cost manufacturing, and inherent flexibility and lightweight characteristics. Despite these advantages, their widespread commercialization remains contingent on surmounting two primary challenges: achieving long-term operational durability and establishing scalable mass production techniques. In response, Japan's National Institute of Advanced Industrial Science and Technology (AIST), supported by the government's Green Innovation Fund, has launched an intensified research and development program. This initiative involves crucial collaborations with leading Japanese companies and universities, strategically aimed at overcoming these technical hurdles and fortifying Japan's global leadership in this vital energy sector.

Key Findings and Technical Progress

AIST has announced substantial progress in its pursuit of commercially viable perovskite solar cells, directly leveraging investments from the Green Innovation Fund. The core of AIST's accelerated R&D program centers on two critical pillars: significantly enhancing long-term durability to achieve a practical operational lifespan of 15 to 20 years, and establishing advanced, scalable manufacturing systems capable of efficient and uniform cell production.

To address durability, AIST's strategy encompasses optimizing perovskite material composition and developing robust encapsulation technologies to fortify barrier performance against environmental degradation from moisture and oxygen. This also involves the creation of high-performance electron and hole transport layers coupled with sophisticated interface engineering—all crucial for ensuring long-term device stability. Concurrently, the institute is pioneering scalable manufacturing techniques, notably roll-to-roll processes, designed to enable uniform film formation over large areas and substantially reduce production costs. By establishing these foundational technologies, AIST aims to fully realize the potential of perovskite solar cells for lightweight and flexible applications, particularly in sectors where conventional silicon-based photovoltaics are impractical, such as Building-Integrated Photovoltaics (BIPV) and the mobility sector.

Outlook and Strategic Significance

Looking ahead, AIST plans to further accelerate its development of durable materials and automated cell manufacturing systems. This strategic push is anticipated to culminate in the full commercialization of perovskite solar cells by the early 2030s. Concurrently, AIST intends to actively contribute to international standardization efforts, aiming to cement Japan's global competitive advantage in this emergent photovoltaic technology.

Source: https://www.youtube.com/watch?v=FQuxN-KlXUU

Collected: June 05, 2026 | Automated Research System (Gemini API)

U.S. DOE Invests Over $60M in Perovskite Solar Cell Development; Announces Update on 2020 Funding Program

Published May 29, 2026 U.S. Department of Energy (DOE) USA

OVERVIEW

The U.S. Department of Energy (DOE) has provided an update on its FY2020 Perovskite Funding Program, confirming substantial ongoing investment in perovskite solar cell R&D, manufacturing, and performance validation. The program aims to enhance device efficiency and stability, address module manufacturing challenges, and develop rigorous test protocols for long-term field performance. To date, the DOE has awarded $20 million in 2020 and $40 million across 22 projects in 2021, totaling over $60 million in strategic funding.

IN DEPTH

Key Findings

The U.S. Department of Energy (DOE) has updated stakeholders on its Fiscal Year 2020 Perovskite Funding Program, underscoring its sustained strategic investment to accelerate the commercialization of perovskite solar cell technology. This program specifically targets improvements in device efficiency and stability, tackles critical challenges in module manufacturing, and establishes robust testing protocols for long-term field performance validation. With $20 million awarded in 2020 and an additional $40 million distributed across 22 promising projects in 2021, the DOE demonstrates a strong commitment to advancing this innovative solar technology.

Technical Details

Funded projects span a broad spectrum of perovskite solar cell challenges. Research focuses on novel material compositions and device architectures to overcome the inherent instability of perovskite materials, alongside optimizing scalable manufacturing techniques such as roll-to-roll printing and spray coating for large-area production. Emphasis is also placed on accelerated degradation testing and real-world outdoor demonstrations to evaluate long-term performance. These efforts are crucial for perovskite solar cells to achieve reliability and cost-effectiveness comparable to or exceeding conventional silicon solar cells.

Background & Context

Perovskite solar cells are emerging as a leading next-generation photovoltaic technology due to their high theoretical efficiency, low-cost material inputs, and adaptability to flexible substrates. The DOE positions perovskite technology as a key strategic area to accelerate the transition to a clean energy economy and enhance U.S. energy independence. This funding program is designed to bridge the critical gap between laboratory breakthroughs and commercial product realization, thereby contributing to technological innovation and competitive strength within the U.S. solar industry.

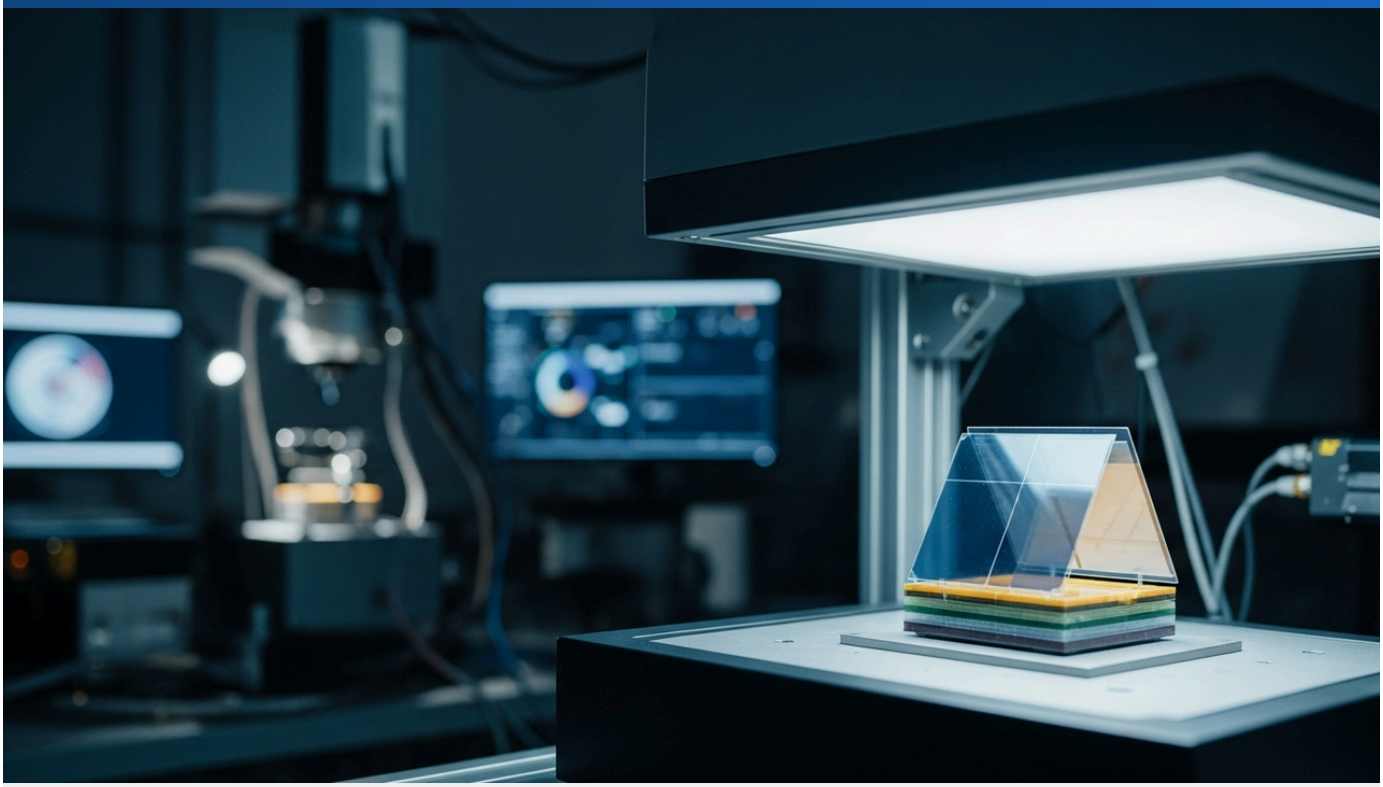
Strategic Significance & Outlook

The DOE plans to explore additional funding opportunities to further support perovskite solar cell R&D and commercialization. The ultimate goal is for perovskite technology to contribute significantly to large-scale power generation, aiding the ambitious target of achieving 100% clean electricity across the U.S. grid by 2035. Anticipated applications extend across diverse market segments, including Building-Integrated Photovoltaics (BIPV) and portable devices, with the introduction of these technologies expected to reduce energy costs and create new jobs.

Source: https://www.energy.gov/cmei/systems/solar-energy-technologies-office-fiscal-year-2020-perovskite-funding-program-0

NUS & JinkoSolar Achieve 32.76% Certified Efficiency in Perovskite-Silicon Tandem Solar Cells, Maintaining 91% Stability After 1,700 Hours

Published May 30, 2026 AcademicJobs SG (National University of Singapore (NUS) and Solar Energy Research Institute of Singapore (SERIS) with JinkoSolar) Singapore



OVERVIEW

Researchers from the National University of Singapore (NUS) and the Solar Energy Research Institute of Singapore (SERIS), in collaboration with China's JinkoSolar, have achieved a remarkable 32.76% certified power conversion efficiency (PCE) for a perovskite-silicon tandem solar cell. This breakthrough represents one of the highest efficiencies recorded for a monolithic perovskite/tunnel oxide passivated contact (TOPCon) tandem cell. Crucially, accelerated degradation tests demonstrated excellent stability, with the cell retaining 91% of its initial efficiency after 1,700 hours, marking a significant step towards commercialization of high-efficiency, long-lifespan next-generation solar cells.

IN DEPTH

Key Findings

Researchers at the National University of Singapore (NUS) and the Solar Energy Research Institute of Singapore (SERIS), in a strategic collaboration with China's JinkoSolar, have achieved a remarkable 32.76% certified power conversion efficiency (PCE) for a perovskite-silicon tandem solar cell. This record-breaking achievement ranks among the highest for monolithic perovskite/tunnel oxide passivated contact (TOPCon) tandem solar cells globally. Furthermore, the device demonstrated exceptional stability, retaining 91% of its initial efficiency after 1,700 hours of continuous operation under accelerated degradation tests, significantly boosting prospects for practical application.

Technical Details

This innovative tandem solar cell employs a stacked architecture, with a transparent perovskite layer on top and a high-efficiency silicon TOPCon cell beneath. Key technological advancements include the optimized interface passivation between the perovskite and silicon layers, along with precise tuning of the light absorption spectrum. This design allows for efficient absorption of different light wavelengths, maximizing overall power generation. Specifically, uniform perovskite film deposition techniques and the integration of stabilizing layers to suppress ion migration have been instrumental in maintaining high efficiency over extended periods. The technology is also designed with compatibility for large-scale production processes, envisioning integration into existing silicon solar cell manufacturing infrastructure.

Background & Context

Perovskite solar cells are gaining significant attention as a next-generation technology poised to surpass the limitations of traditional silicon solar cells, owing to their high efficiency potential and low manufacturing costs. The tandem architecture, combining perovskite with silicon, is particularly promising for achieving efficiencies beyond the theoretical limits of single-junction devices. This breakthrough exemplifies the success of international collaboration between Singaporean research institutions and a major Chinese solar manufacturer, marking a critical milestone towards global clean energy goals. The development of such high-efficiency, highly stable tandem cells fortifies the technological foundation necessary to accelerate the global energy transition.

Strategic Significance & Outlook

The certified efficiency of 32.76% and high stability after 1,700 hours provide compelling evidence for the commercial viability of perovskite-silicon tandem solar cells. This technology is expected to see widespread adoption across various applications, including residential rooftops, commercial buildings, and utility-scale solar farms. With the involvement of major manufacturers like JinkoSolar, large-scale production and market introduction are becoming increasingly realistic within the next few years. This achievement is poised to play a crucial role in further reducing the cost of solar electricity and accelerating the global deployment of renewable energy.

Source: https://www.academicjobs.com/sg/higher-education-news/nus-3276percent-tandem-solar-breakthrough-or-academicjobs-sg-11549

Collected: June 05, 2026 | Automated Research System (Gemini API)

Perovskite Solar Industry Shifts Focus from Lab Efficiency to Mass Production Scalability, Reliability, and Manufacturing Economics

Published May 31, 2026 SolarVision USA

OVERVIEW

The perovskite solar cell industry is strategically shifting its focus from achieving record laboratory efficiencies to addressing the pressing challenges of mass production scalability, long-term reliability, and manufacturing economics. Industry experts emphasize that beyond mere record cell performance, the maturity of technology and manufacturing processes, along with robust reliability data for warranty claims, are paramount. To truly achieve mass production, factors such as capital investment, manufacturing yield, and learning curves must be treated as critical design constraints from the outset.

IN DEPTH

Key Findings

The perovskite solar cell industry is strategically reorienting its primary focus from achieving record-breaking laboratory efficiencies to tackling the practical challenges of mass production scalability, long-term reliability, and manufacturing economics. According to SolarVision's analysis, industry experts are strongly advocating for a shift beyond merely pursuing high-efficiency, small-area cell performance. Instead, they highlight the critical importance of technology and manufacturing process maturity, alongside robust reliability data that can support product warranties. It is concluded that to truly achieve mass production, considerations such as capital expenditure, manufacturing yields, and production learning curves must be integrated as stringent design constraints from the initial development phases.

Technical Details

This paradigm shift directly translates into a need for standardized and automated manufacturing processes, stable supply chains for materials, and advanced degradation mitigation technologies for long-term outdoor performance. Specifically, this demands large-area uniform perovskite film deposition techniques (e.g., slot-die coating, blade coating), highly reliable encapsulation methods, and module-level designs that minimize efficiency losses. Reliability data must be rigorously collected through accelerated degradation tests under conditions like high humidity and temperature, UV irradiation, and thermal cycling, adhering to international standards such as those set by the IEC. Such data will be crucial for investors, insurers, and customers in making adoption decisions for perovskite products.

Background & Context

Perovskite solar cells have witnessed remarkable R&D progress over the past decade as a next-generation technology with the potential to surpass silicon in theoretical efficiency and offer lower manufacturing costs. However, the transition from laboratory to factory presents a technological and economic 'valley of death'. This recognition mirrors the challenges faced by the nascent silicon solar industry regarding mass production and reliability, a stage the perovskite industry must navigate for sustainable growth. While single-junction perovskite modules are finding success in niche markets like BIPV and lightweight panels, high-efficiency perovskite-silicon tandem architectures remain a key focus for mass market adoption, with overcoming their manufacturing challenges being critical.

Strategic Significance & Outlook

This strategic redirection within the industry is of paramount importance for accelerating the commercialization of perovskite solar cells. Going forward, companies will concentrate R&D investments on improving productivity, enhancing quality control, reducing costs, and conducting extensive long-term durability testing. Collaboration with government agencies and standardization bodies will also intensify to develop certification schemes and standards that facilitate broad market acceptance of perovskite products. This shift in focus signifies the next crucial phase for perovskite solar cells to establish their position as major players in the global energy mix.

Source: https://solarvision.org/perovskite-solar-industry-shifts-focus-toward-mass-production-scalability/

Collected: June 05, 2026 | Automated Research System (Gemini API)

Trina Solar Achieves New World Record with 907W Perovskite/Silicon Tandem Module, 29.2% Efficiency on Industry Standard Size for Mass Application

Published June 02, 2026 EnergyTrend China

OVERVIEW

Trina Solar announced a new world record with its self-developed perovskite/crystalline silicon tandem solar module, achieving a peak power output of 907W and a full-area module efficiency of 29.2% on an industry-standard 3.1 square meter size. This breakthrough, validated by TÜV SÜD, is attributed to the company's 210mm large-size tandem cell technology system, which involved enhancing perovskite film uniformity, innovating interface passivation solutions, and fine-tuning tandem spectral absorption adaptability. The standardized industrial size design indicates strong feasibility for large-scale industrial applications.

IN DEPTH

Key Findings

Trina Solar, a leading Chinese photovoltaic manufacturer, has announced a new world record for its perovskite/crystalline silicon tandem solar module, achieving a peak power output of 907W and a full-area module conversion efficiency of 29.2% on an industry-standard 3.1 square meter size. This groundbreaking achievement, validated by TÜV SÜD in Germany, marks a crucial milestone towards the large-scale commercialization of perovskite solar cells. The fact that this module achieves high efficiency in a standard industrial size significantly shortens its path to practical application.

Technical Details

This record was made possible by multiple technological innovations within Trina Solar's 210mm large-size tandem cell technology system. Key advancements include:

- **Improved Perovskite Film Uniformity:** Establishment of a uniform perovskite layer deposition technique over large-area substrates, ensuring high efficiency and reproducibility.
- **Innovative Interface Passivation Solutions:** Introduction of advanced passivation technologies to minimize recombination losses at the interface between the perovskite and silicon layers.
- **Fine-Tuning of Tandem Spectral Absorption Adaptability:** Optimization of the spectral response to allow the top perovskite layer and bottom silicon layer to absorb different wavelengths of sunlight with maximum efficiency.
- **Large-Area Perovskite Film Deposition:** Enhanced process control in large-scale production through roll-to-roll slot-die coating, vapor-assisted crystallization, and integration of an ITO tunneling layer.

These technologies suppress efficiency degradation at the module level and, combined with high-reliability encapsulation, contribute to long-term performance stability.

Background & Context

As the efficiency limits of conventional silicon solar cells are approached, perovskite-silicon tandem technology is considered the most promising approach for achieving even higher conversion efficiencies. Trina Solar's achievement is particularly significant because it is not merely a laboratory record but a record for an industrially applicable, large-scale module. This clearly indicates that perovskite technology is transitioning to the next phase of commercialization, intensifying competition in the global solar market. China leads the world in perovskite solar cell R&D and manufacturing, and this announcement further solidifies its position.

Strategic Significance & Outlook

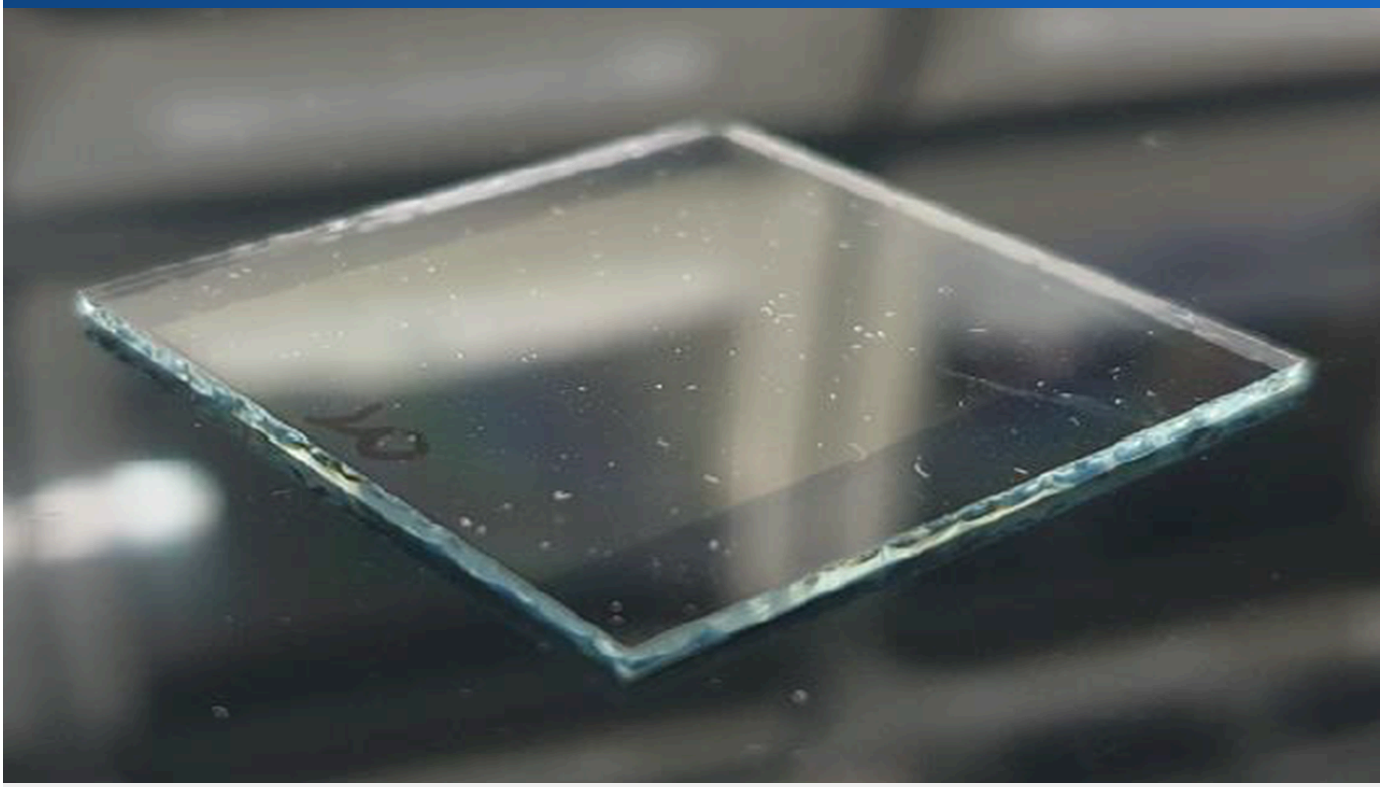
With this world record, Trina Solar aims to play a leading role in the commercialization of next-generation solar cell technology. The adoption of a standardized industrial size design will facilitate integration into existing solar power systems and promote adoption across a wide range of applications, including Building-Integrated Photovoltaics (BIPV) and utility-scale power plants. The company is expected to continue accelerating the market introduction of high-efficiency, low-cost perovskite tandem modules through ongoing R&D and technological innovation, thereby making a significant contribution to the global renewable energy transition.

Source: https://www.energytrend.com/news/20260602-33230.html

Collected: June 05, 2026 | Automated Research System (Gemini API)

IIT Guwahati Achieves 25.73% Perovskite Solar Cell Efficiency and 90% Long-Term Stability via Molecular Interface Engineering, Eyeing Memory Device Applications

Published June 02, 2026 IIT Guwahati India



OVERVIEW

Researchers at IIT Guwahati have revolutionized perovskite semiconductor technology by significantly enhancing solar cell performance and stability through a molecular interface engineering approach. The developed perovskite solar cells achieved a high power conversion efficiency of 25.73% and demonstrated excellent durability, retaining approximately 90% of their initial performance after long-term storage. This technology also shows potential for advanced memory device applications in future computing.

IN DEPTH

Key Findings

A research team at the Indian Institute of Technology Guwahati (IIT Guwahati) has made a significant leap in perovskite semiconductor technology using an innovative approach called Molecular Interface Engineering. This new technique has enabled perovskite solar cells to achieve a high power conversion efficiency (PCE) of 25.73% while demonstrating exceptional stability, maintaining approximately 90% of their initial performance after long-term storage. Furthermore, this technology extends beyond solar cells, showing promise for high-performance memory devices for future computing applications.

Technical Details

The researchers successfully optimized charge carrier extraction efficiency and minimized non-radiative recombination losses by precisely controlling the interface between the perovskite layer and the charge transport layers at a molecular level. This molecular interface engineering approach also controls perovskite crystal growth, reducing defect densities. The resulting devices exhibit enhanced photostability and thermal stability, leading to a substantial improvement in durability under practical operating conditions. Specific stability tests confirmed that 90% of initial performance was maintained after long-term storage, addressing one of the primary challenges for conventional perovskite solar cells. For memory device applications, the unique electrical properties of perovskite materials are leveraged, promising high-speed and low-power data storage.

Background & Context

Perovskite solar cells have garnered global attention as a next-generation solar cell technology due to their high conversion efficiency and potential for low-cost manufacturing. However, ensuring device stability and long-term durability has remained a significant hurdle for their commercialization. IIT Guwahati's breakthrough offers a promising solution to this challenge, substantially accelerating the practical application of perovskite technology. Moreover, demonstrating applications beyond solar cells, such as memory devices, highlights the diverse potential of perovskite materials, potentially creating new ripple effects across the entire electronics industry. This indigenous technological advancement is also crucial within the context of India's renewable energy promotion policies.

Strategic Significance & Outlook

The IIT Guwahati research team plans to further optimize this molecular interface engineering approach, continuing research towards even higher efficiencies and longer-term stability. Specifically, efforts will focus on validating scalability for large-scale production and developing functional prototypes for memory devices. Commercialization of this technology is expected not only to improve the cost-effectiveness of solar power but also to significantly contribute to India's energy self-sufficiency and the development of its clean energy technology ecosystem. Additionally, providing high-performance, low-cost memory devices holds the potential to advance next-generation technologies such as AI and IoT.

Source: https://iitg.ac.in/news/17158

UNSW's 'Father of Solar,' Professor Martin Green, Tackles Perovskite Durability Frontier: Announces 35.2% Tandem Efficiency and Field Test Facility Establishment

Published June 05, 2026 UNSW Sydney Australia

OVERVIEW

Professor Martin Green, globally recognized as the 'Father of Silicon Solar Cells' at UNSW, is now addressing the next frontier in perovskite solar cells, focusing on long-term stability. The latest International Solar Cell Efficiency Table reports a remarkable 35.2% efficiency for perovskite-on-silicon tandem cells. UNSW further announced plans to establish an independent field test facility to evaluate the durability of perovskite modules under real-world conditions, accelerating the establishment of reliability for commercialization.

IN DEPTH

Key Findings

Professor Martin Green of UNSW, widely celebrated as the 'Father of Solar Cells' for his profound contributions to silicon photovoltaic development, is now spearheading efforts to address the critical challenge of long-term durability in next-generation perovskite solar cells. The latest 'International Solar Cell Efficiency Table,' published in Joule, reported record-breaking efficiencies of 28.0% for single-junction perovskite cells and an impressive 35.2% for perovskite-on-silicon tandem cells. Complementing these technical advancements, UNSW has unveiled plans to establish an independent field testing facility dedicated to validating the real-world reliability of perovskite modules, thereby accelerating their path to commercialization.

Technical Details

While perovskite solar cells have shown astonishing improvements in efficiency, their stability and durability have remained one of the most significant barriers to large-scale commercial deployment. Professor Green's research is specifically targeting this durability issue, exploring solutions through innovations in materials science, device architecture, and encapsulation technologies. Perovskite-on-silicon tandem cells are particularly promising, achieving higher conversion efficiencies than single-junction cells by efficiently absorbing different wavelengths of sunlight. The planned UNSW field test facility aims to meticulously monitor the long-term performance degradation of various perovskite modules under actual climatic conditions (temperature fluctuations, humidity, UV exposure, etc.). The objective is to demonstrate reliability capable of withstanding typical product warranty periods (usually 25 years), which is crucial for obtaining the real-world validation data essential for commercialization, as laboratory data alone are insufficient.

Background & Context

Over several decades, Professor Martin Green has driven the efficiency improvements of silicon solar cells, elevating photovoltaics to a major renewable energy source. His deep involvement in perovskite technology serves as a powerful endorsement of its future potential. The perovskite-silicon tandem technology is especially appealing due to its compatibility with existing silicon solar cell manufacturing infrastructure, promising a quicker route to market. As global energy demand continues to rise and decarbonization becomes an urgent imperative, the advent of more efficient and cost-effective solar cell technologies is indispensable for accelerating the energy transition. Independent durability testing plays a decisive role in demonstrating the reliability of perovskite technology to investors, consumers, and regulatory bodies.

Strategic Significance & Outlook

Professor Green's research at UNSW and the establishment of the new field testing facility represent critical steps towards overcoming the reliability challenges in commercializing perovskite solar cells. These advancements could lead to the widespread market introduction of perovskite-silicon tandem cells within the next few years, potentially dramatically improving the cost-effectiveness of solar power. Broad adoption is anticipated across various applications, including rooftop installations, utility-scale solar farms, and Building-Integrated Photovoltaics (BIPV). The proliferation of this technology will expand solar energy's share in the global energy mix and significantly contribute to climate change mitigation efforts.

Source: https://www.unsw.edu.au/newsroom/news/2026/06/father-of-modern-solar-approaches-the-next-frontier

U.S. DOE and Kodak Advance Perovskite Solar Cell Manufacturing with High-Speed Roll-to-Roll Printing, Targeting 4GW Annual Production and Enhanced Durability

Published May 29, 2026 U.S. Department of Energy (DOE) USA

OVERVIEW

The U.S. Department of Energy (DOE) has highlighted efforts by Energy Materials Corporation (EMC) and Jinsong Huang's team to manufacture perovskite solar cells using Kodak's high-speed roll-to-roll printers. This groundbreaking technology has increased the coating speed of liquid perovskite solutions by fivefold, aiming for an annual production capacity of 4 gigawatts (GW). The project addresses challenges in low-cost, high-speed solar cell manufacturing, with a particular focus on improving product durability.

IN DEPTH

Key Findings

The U.S. Department of Energy (DOE) has showcased a groundbreaking approach to manufacturing perovskite solar cells, led by Energy Materials Corporation (EMC) and Jinsong Huang's team from the University of North Carolina at Chapel Hill. This initiative utilizes Kodak's high-speed roll-to-roll printers, renowned for their use in photographic film production. A major achievement of this project is a fivefold increase in the coating speed of liquid perovskite solutions. This advancement brings the production of perovskite solar cells at a scale capable of generating 4 gigawatts (GW) of electricity annually closer to reality, promising dramatic reductions in manufacturing costs and significantly improved long-term product durability.

Technical Details

Roll-to-roll printing is a manufacturing technique suitable for low-cost, high-volume production, involving the continuous application of functional materials onto flexible substrates. Kodak's printers offer exceptional precision and speed in this process, enabling uniform and efficient formation of perovskite layers. Compared to conventional batch manufacturing, the roll-to-roll process substantially reduces production time and energy consumption. The EMC and Huang team optimized ink composition, drying conditions, and post-deposition annealing processes to adapt this technology for perovskite materials. This results in homogeneous perovskite films with fewer defects over large areas, achieving high power conversion efficiency and stability. A particular focus is placed on enhancing durability in harsh environments, such as high humidity and elevated temperatures, with new encapsulation technologies and interface engineering being developed concurrently.

Background & Context

Perovskite solar cells hold immense promise as a next-generation photovoltaic technology due to their high theoretical efficiency and the availability of low-cost materials. However, a primary barrier to their commercialization has been establishing a scalable and cost-effective manufacturing method. The DOE's strategy to leverage existing printing technologies and expertise, such as Kodak's, to overcome this manufacturing challenge is highly logical. This approach bypasses the need for cleanroom environments and expensive equipment typically required for traditional semiconductor manufacturing, potentially accelerating the widespread adoption of photovoltaic technology. This initiative is positioned as a critical step for the U.S. to lead globally in clean energy technologies and enhance energy security.

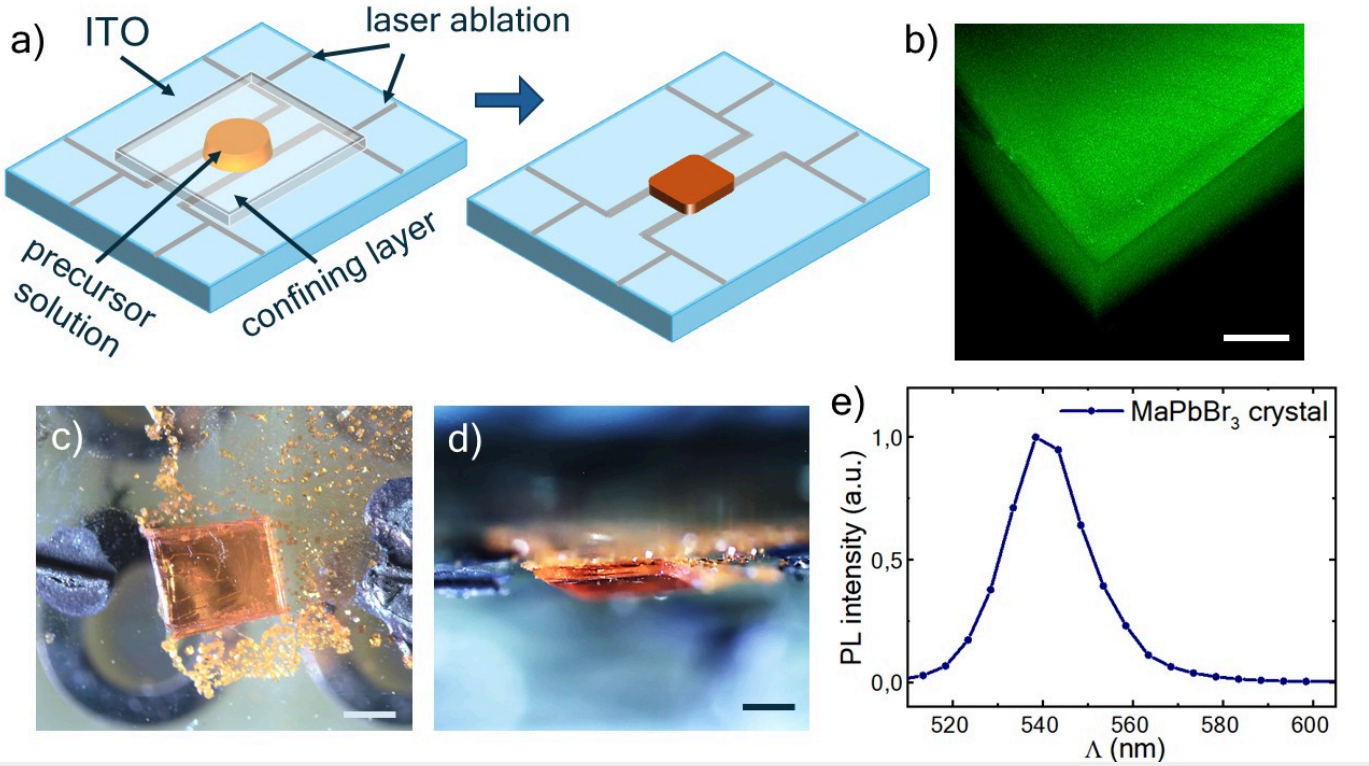
Strategic Significance & Outlook

Further optimization and scale-up of this high-speed roll-to-roll printing technology are expected to significantly reduce the cost of perovskite solar cells and accelerate their market entry. The annual production target of 4 GW is equivalent to powering millions of homes and holds significant implications for expanding solar energy's share in the global energy mix. In the future, flexible perovskite modules are anticipated to be deployed in diverse applications, including Building-Integrated Photovoltaics (BIPV), portable electronics, and electric vehicles. This technology has the potential to boost clean energy utilization and make substantial contributions to achieving a sustainable society.

Source: #

arXiv Paper: Thin Single-Crystal Perovskite Detector for High-Energy Charged Particles Shows Promise for Real-Time Electron Monitoring

Published May 29, 2026 arXiv (Preprint)



OVERVIEW

A preprint paper on arXiv reports the development of a thin single-crystal perovskite device for high-energy charged particle detection. The study presents a thin OMHP (organic metal halide perovskite) crystal-based detector suitable for real-time monitoring of high-energy electrons. Future implications suggest growing larger-area single-crystal perovskites directly on pixelated electronic chips for imaging and monitoring applications.

IN DEPTH

Key Findings

A recent preprint published on arXiv details the groundbreaking development of a thin single-crystal perovskite device intended for high-energy charged particle detection. This research presents a thin detector based on organic metal halide perovskite (OMHP) single crystals, particularly well-suited for the real-time monitoring of high-energy electrons. This technology opens new avenues for perovskite materials in the field of radiation detection, with diverse applications anticipated in medical imaging, high-energy physics research, and beyond.

Technical Details

The developed detector utilizes thin OMHP single crystals fabricated through a unique growth technique. Its uniform crystalline structure and high carrier mobility enable precise detection of high-energy particles. Experiments using high-energy electron beams demonstrated the device's high sensitivity and fast response time. Being thin, it minimizes interference with particle beams while achieving efficient detection. Compared to conventional semiconductor detectors, perovskite materials offer lower manufacturing costs and excellent room-temperature operating characteristics, potentially providing more accessible high-energy particle detection solutions. The researchers thoroughly discuss the device fabrication procedures, structure, electrical and optical characterization, and detector performance evaluation results using a high-energy electron test beam.

Background & Context

High-energy charged particle detection is an indispensable technology in fields such as particle physics, nuclear medicine, cosmic ray research, and nuclear security. Existing detectors often face challenges of high cost or optimal performance only under specific conditions. Perovskite materials have already shown promise for X-ray and gamma-ray detectors due to their excellent radiation tolerance, high atomic number, and tunable bandgap properties. This research extends perovskite applications to charged particle detection, addressing the need for more efficient and cost-effective detectors in high-energy physics facilities and medical institutions.

Strategic Significance & Outlook

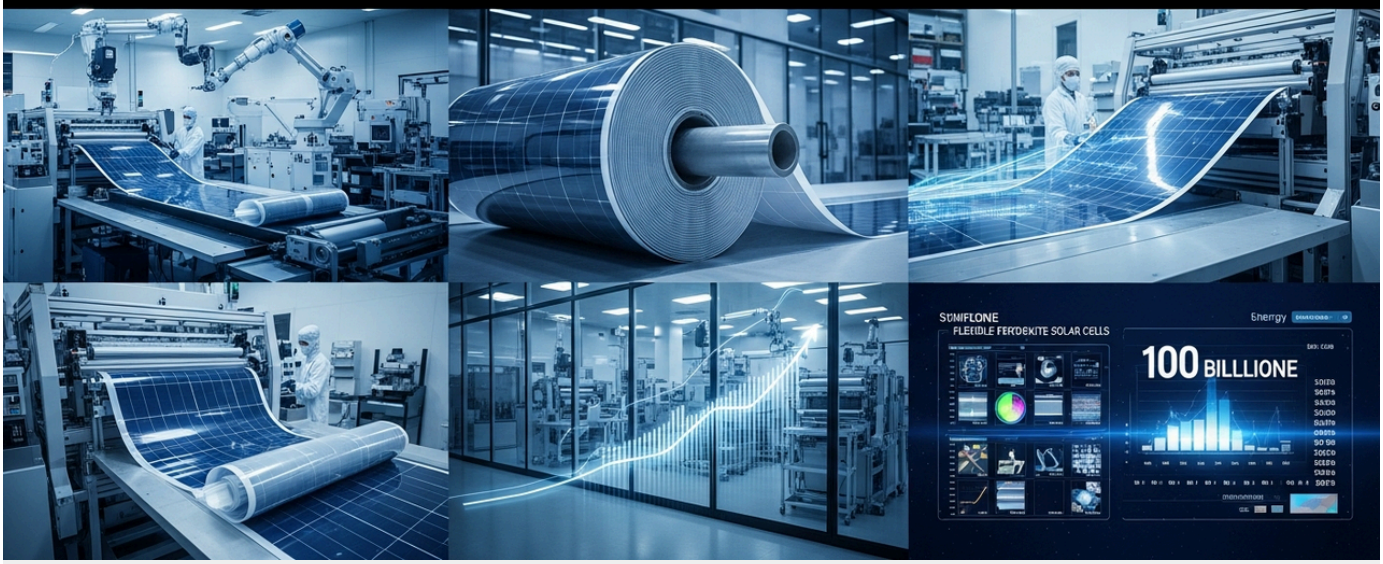
The development of this thin single-crystal perovskite detector holds the potential to revolutionize radiation detection technology. The research team aims to further develop larger-area single-crystal perovskites and establish techniques for directly growing them onto pixelated electronic chips. This would enable applications in high-resolution imaging devices and broader monitoring systems. For instance, it could lead to real-time radiation monitoring, enhanced resolution in medical PET scans, and improved cosmic radiation measurements. This technology is expected to generate new breakthroughs in both scientific research and industrial applications.

Source: https://arxiv.org/html/2605.29764

Collected: June 05, 2026 | Automated Research System (Gemini API)

Sekisui Chemical's Perovskite Solar Cell Program Increases Capital Expenditure and Execution Risk Amidst Diversified Business Operations: A Financial Assessment

Published June 03, 2026 Perplexity (Sekisui Chemical Co., Ltd. related news) Japan



OVERVIEW

Sekisui Chemical, a diversified Japanese conglomerate with four core businesses, is seeing its perovskite solar cell program increase capital expenditure pressure and execution risk, despite not yet generating revenue. This comes at a time when its core businesses have failed to meet operating profit targets. The situation highlights the challenge of balancing aggressive investment in new technologies with the performance of existing business segments.

IN DEPTH

Key Findings

Sekisui Chemical Co., Ltd., a diversified Japanese conglomerate spanning housing, urban infrastructure & environmental products, high-performance plastics, and medical sectors, is currently pursuing a perovskite solar cell program that is not yet revenue-generating. Analysis suggests that this substantial investment in perovskite technology is increasing financial pressure and project execution risks, particularly during a period when its established core businesses have not met operating profit targets. This scenario underscores a common challenge for conglomerates: how to strategically balance aggressive investments in emerging growth areas with the short-term profitability of existing operations.

Technical Details

Sekisui Chemical's perovskite solar cell program focuses on developing flexible film-type solar cells under the brand name 'Solafil'. This technology leverages characteristics such as lightweight, thinness, and flexibility, aiming for applications on building facades, curved surfaces, and structures with low load-bearing capacity, where traditional silicon solar cells are difficult to install. The company has announced plans to establish a 100 MW mass production line by 2027, targeting a power conversion efficiency of 20% and a 20-year service life. Such large-scale production infrastructure requires substantial initial investment, making technical validation and market success imperative.

Background & Context

Perovskite solar cells are garnering global attention as a next-generation renewable energy technology, but challenges in durability, cost, and manufacturability persist for their commercialization. A chemical materials manufacturer like Sekisui Chemical entering this field benefits from its expertise in material development. However, entering a new market entails risks such as long payback periods for upfront investments and intense technological competition. Against the backdrop of the Japanese government's regulatory easing to promote perovskite solar cells, Sekisui Chemical's initiatives play a crucial role in enhancing Japan's energy self-sufficiency and achieving its decarbonization goals. Nevertheless, its strategic positioning and financial implications remain key considerations for investors.

Strategic Significance & Outlook

Sekisui Chemical aims to establish a new revenue stream through the mass production and market introduction of its 'Solafil' perovskite solar cells. If successful, the company could create synergies with its high-performance plastics and housing businesses, establishing a dominant position in the Building-Integrated Photovoltaics (BIPV) market. However, this requires overcoming technical hurdles, managing initial production costs, and accurately capturing market demand. While the company's extensive industrial footprint and global reach are potential strengths supporting this new venture, the financial health of the perovskite business will increasingly become a critical factor in Sekisui Chemical's future strategic management.

Source: #

Halocell Energy Secures Australian Government Grant for Perovskite PV Scale-Up: Wagga Wagga Facility to Upgrade to Advanced Roll-to-Roll Equipment

Published June 01, 2026 Solarbytes (Halocell Energy) Australia

OVERVIEW

Perovskite solar cell technology manufacturer Halocell Energy has secured a significant grant from the Australian government's Industry Growth Program. This funding will be used to substantially scale up the production of the company's next-generation perovskite solar cell modules. Specifically, it aims to upgrade its manufacturing facility in Wagga Wagga with advanced roll-to-roll equipment and optimize production processes, establishing large-scale manufacturing capabilities for commercialization. This strengthens Halocell Energy's capacity to supply perovskite products to both Australian and international markets.

IN DEPTH

Key Findings

Halocell Energy, an Australian developer and manufacturer of perovskite solar cell technology, has been awarded a strategic grant from the Australian Government's Industry Growth Program. This crucial funding is directly allocated to significantly expand the production scale of the company's next-generation perovskite solar cell modules. Specifically, the objective is to accelerate the establishment of large-scale manufacturing capabilities for commercialization by upgrading its existing facility in Wagga Wagga, New South Wales, with state-of-the-art roll-to-roll (R2R) equipment and optimizing production processes. This investment represents a vital step in bolstering Australia's domestic clean energy manufacturing capacity and enhancing its competitiveness in international markets.

Technical Details

The perovskite solar cells developed by Halocell Energy are specialized for lightweight and flexible applications, where traditional silicon solar cells are difficult to install. Roll-to-roll manufacturing technology enables the mass production of low-cost, high-efficiency modules by continuously depositing perovskite layers onto flexible substrates. With this grant, the company will advance the automation of its production line, improving the precision and reproducibility of manufacturing processes. This will enhance quality control to ensure uniform efficiency across large-area modules and long-term durability. Concurrently, as production scales up, Halocell aims to optimize the entire supply chain, from material procurement to final product, to further reduce manufacturing costs.

Background & Context

The Australian Government is actively implementing policies to strengthen domestic manufacturing and foster innovation in clean energy technologies. Perovskite solar cells are expected to play a critical role in the global energy transition due to their high efficiency, potential for low-cost manufacturing, and versatility. The grant to Halocell Energy is part of a national strategy for Australia to be at the forefront of this next-generation technology. Expanding domestic production capacity for perovskite solar cells contributes to strengthening energy security, reducing reliance on fossil fuels, and creating new jobs. Through this, Australia aims to establish itself as a clean energy leader in the Asia-Pacific region.

Strategic Significance & Outlook

Halocell Energy plans to leverage this grant to establish a mass production system for perovskite solar cell modules at its Wagga Wagga factory, with product market introduction targeted for the late 2020s. The expanded production capacity will enable the company to meet demand across a wide range of applications, including Building-Integrated Photovoltaics (BIPV), portable power solutions, electric vehicles, and off-grid systems. With its proprietary technology and government support, the company is eyeing expansion not only within Australia but also into regional markets like Southeast Asia and the Pacific Islands. Halocell Energy's success will serve as a model case for the entire Australian clean energy industry, encouraging further investment and innovation.

Source: https://solarbytes.info/australia-bytes/halocell-energy-grant-supports-perovskite-pv-manufacturing-scale-up-australia-11895181

Yingfa Ruineng Achieves 26.78% Efficiency and 724W Output for Large-Format Perovskite-BC Tandem Module, Successfully Scaling with 4-Terminal Architecture

Published June 01, 2026 PV-Tech (Yingfa Ruineng) China

OVERVIEW

Chinese solar cell manufacturer Yingfa Ruineng has developed an innovative perovskite/back-contact (BC) tandem module, utilizing subsidiary-produced BC cells as the bottom layer, achieving 26.78% conversion efficiency and 724W output. This large-format module (2.384m × 1.134m) employs a 4-terminal (4T) tandem architecture, where the perovskite top cell contributes over half of the module's power generation, enabling efficient electricity production. This achievement marks a significant advancement in scaling up perovskite technology and enhancing its efficiency.

IN DEPTH

Key Findings

Yingfa Ruineng, a Chinese solar cell manufacturer, has unveiled an innovative perovskite/back-contact (BC) tandem solar module that integrates high-performance BC cells produced by its subsidiary as the bottom cell. This large-format module, measuring 2.384m × 1.134m, achieves an impressive 26.78% conversion efficiency and a power output of 724W. This accomplishment represents a significant milestone in scaling up perovskite technology, enhancing its efficiency, and integrating it with existing silicon technology, marking a substantial step towards the commercialization of next-generation solar cells.

Technical Details

Yingfa Ruineng employs a 4-terminal (4T) tandem architecture. In this design, a transparent perovskite solar cell is positioned at the top, absorbing short-wavelength sunlight to generate electricity. Below it, a BC silicon solar cell developed by Yingfa's subsidiary absorbs longer-wavelength sunlight. A key advantage of the 4T structure is the ability to independently optimize and perform maximum power point tracking (MPPT) for both the top and bottom cells, thereby maximizing overall power generation efficiency. In this module, the perovskite top cell accounts for over half of the total power output, demonstrating the high potential of perovskite technology. Maintaining high efficiency in a large-format module is attributed to uniform perovskite film deposition techniques, suppression of interface defects, and the development of efficient charge transport layers.

Background & Context

As the efficiency limits of conventional silicon solar cells are approached, perovskite-silicon tandem solar cells are considered the most promising technology for achieving higher power conversion efficiencies. BC cells, in particular, maximize light absorption area by eliminating metal grids on the cell surface, offering a high-efficiency approach among existing silicon technologies. The success of a Chinese company like Yingfa Ruineng in scaling up such high-efficiency tandem modules indicates China's sustained and strengthening technological leadership in the global solar power market. This technology is expected to see widespread adoption in residential, commercial, and utility-scale power plants, accelerating the deployment of renewable energy.

Strategic Significance & Outlook

Yingfa Ruineng's large-format perovskite/BC tandem module is now at a crucial stage for mass production and market introduction. The high efficiency of 26.78% and high output of 724W will improve the cost-performance ratio of solar power systems and maximize power generation per unit area. In the future, it is anticipated that the integration of this technology into existing silicon solar cell manufacturing lines will further accelerate mass production. This breakthrough will be a significant step in establishing perovskite solar cells as a major player in the global energy mix. Particularly as the transition to a low-carbon society accelerates, such innovative solar cell technology will make a substantial contribution to energy sustainability.

Source: https://www.perovskite-info.com/yingfa-ruineng-s-large-format-perovskite-bc-tandem-module-achieves-2678

Collected: June 05, 2026 | Automated Research System (Gemini API)

Sekisui Chemical's 'Solafil' Flexible Perovskite Solar Cells Officially Launched: Targeting 100MW Mass Production by 2027 with 20% Efficiency and 20-Year Lifespan

Published June 04, 2026 YouTube (News commentary on Sekisui Chemical) Japan

OVERVIEW

Sekisui Chemical announced the full-scale launch of 'Solafil,' Japan's first film-type perovskite solar cell, in March 2026. This flexible, thin, and lightweight solar cell enables power generation in locations previously challenging for conventional silicon solar cells, such as building facades, curved roofs, or structures with low weight-bearing capacity. Sekisui Chemical aims to establish a 100MW mass production line by 2027, targeting 20% power conversion efficiency and a 20-year service life, poised to innovate Japan's energy landscape.

IN DEPTH

Key Findings

Sekisui Chemical Co., Ltd. commenced the full-scale market introduction of 'Solafil,' Japan's first film-type perovskite solar cell, in March 2026. This innovative solar cell, characterized by its flexibility, thinness, and lightweight nature, enables solar power generation in novel locations that were physically challenging for conventional heavy and rigid silicon solar cells. These include building facades, curved roofs, or structures with limited load-bearing capacity. Sekisui Chemical aims to establish an annual mass production line with a capacity of 100 megawatts (MW) by 2027, targeting a power conversion efficiency of 20% and a 20-year service life, expecting to bring significant transformation to Japan's renewable energy market.

Technical Details

'Solafil' integrates proprietary high-performance perovskite materials with Sekisui Chemical's extensive expertise in polymer film technology. This film-type solar cell is extremely lightweight, approximately 0.1mm thick and weighing about 1kg/m^2, minimizing additional load on existing structures. The manufacturing process adopts a roll-to-roll method, enabling cost-efficient mass production. A 20% power conversion efficiency is a high standard for single-junction perovskite solar cells, comparable to conventional silicon solar cells. Crucially, the target of a 20-year long-term service life addresses a major stability challenge for perovskite solar cells, suggesting significant advancements in encapsulation and material degradation suppression technologies. This not only increases installation flexibility but also contributes to long-term operational cost reductions.

Background & Context

Japan faces unique challenges in expanding solar power adoption due to its limited land area and constraints from existing buildings. Sekisui Chemical's 'Solafil' is anticipated as a solution to these challenges, significantly broadening the possible installation sites for solar power. This aligns with government support, such as the Green Innovation Fund program led by the Ministry of Economy, Trade and Industry, and regulatory reforms aimed at promoting perovskite solar cells. Specifically, government initiatives like the review of area calculation standards for photovoltaic equipment under the Factory Location Act and clarification of building code/electricity business act rules for BIPV (Building-Integrated Photovoltaics) will strongly support the market expansion of products like Solafil. Sekisui Chemical's venture is seen as playing an indispensable role in achieving Japan's decarbonization goals and strengthening its energy security.

Strategic Significance & Outlook

Through the full-scale sales of 'Solafil,' Sekisui Chemical plans to initially focus on installations on roofs and facades of commercial facilities, factories, and public buildings within Japan. In the future, the company envisions broader applications in the residential market, as well as in areas like automobiles and IoT devices. The operation of the 100MW mass production line by 2027 will ensure stable supply to the market and further drive down costs. Widespread adoption of this film-type perovskite solar cell could dramatically increase renewable energy generation in urban areas while harmonizing with urban landscapes. Sekisui Chemical aims to expand this technology into global markets, contributing to the world's energy transition.

Source: #

Former U.S. Energy Secretary Jennifer Granholm Joins Tandem PV Board of Directors to Accelerate Perovskite-Silicon Tandem Solar Cell Commercialization

Published June 01, 2026 Tandem PV (via press release distribution) USA

OVERVIEW

Former U.S. Energy Secretary Jennifer Granholm has joined the board of directors of Tandem PV, a company developing perovskite-silicon tandem solar cells. Tandem PV was founded through the DOE's Activate accelerator after co-founder and CTO Colin Bailie developed the world's first perovskite-silicon tandem solar cell at Stanford University. The company has raised a total of $87 million from venture capital, debt, and government funding, and Granholm's appointment provides a significant boost towards commercialization.

IN DEPTH

Key Findings

Former U.S. Energy Secretary Jennifer Granholm has been appointed to the board of directors of Tandem PV, a pioneering company developing next-generation perovskite-silicon tandem solar cells. This strategic appointment is critically significant for strengthening the collaboration between government, industry, and academia in the clean energy sector, and for accelerating the commercialization of Tandem PV's innovative technology. Ms. Granholm is expected to bring extensive experience and knowledge in energy policy and renewable energy deployment to Tandem PV, providing a powerful impetus to the company's growth trajectory.

Technical Details

Tandem PV traces its origins to co-founder and CTO Colin Bailie's development of the world's first perovskite-silicon tandem solar cell at Stanford University. The company aims to achieve efficiencies exceeding 30%, which is unattainable by single solar cells, by layering a thin perovskite film on top of existing silicon solar cells. To date, Tandem PV has raised a total of $87 million through venture capital, debt, and government funding, securing the capital required to build a 40-megawatt (MW) demonstration plant. Ms. Granholm's expertise is expected to contribute to strategic planning in areas addressing the technical challenges faced by Tandem PV, particularly in scalability for mass production, long-term stability, and securing the supply chain.

Background & Context

Perovskite-silicon tandem solar cells hold the potential to break through the efficiency limits of conventional silicon solar cells and significantly improve the cost-effectiveness of solar power. The United States is accelerating investment in clean energy technologies to combat climate change and enhance energy independence, positioning perovskite technology at the forefront of these efforts. The addition of a prominent policymaker like Jennifer Granholm to a private company's board signals an alignment between government priorities and corporate strategic goals, instilling strong confidence in investors and the broader market. This also underscores deep-rooted collaboration with government agencies, given Tandem PV's origins as a startup emerging from the DOE's Activate accelerator program.

Strategic Significance & Outlook

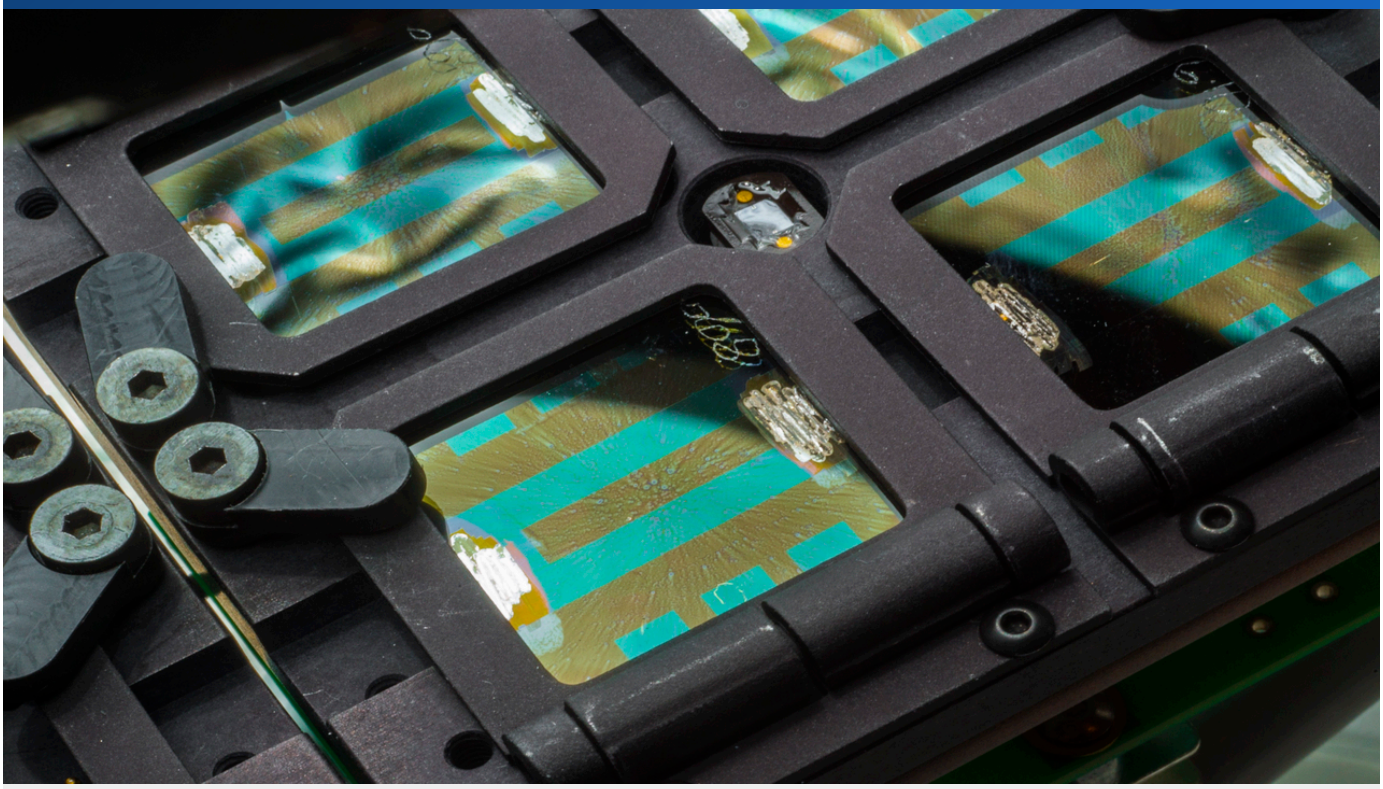
Ms. Granholm's involvement with Tandem PV's board marks a pivotal moment for accelerating the company's technological development and market deployment. The company has already begun shipping T20 modules to utility-scale customers, which is clear evidence that perovskite-silicon tandem technology is transitioning from the laboratory to practical application. Moving forward, Tandem PV will aim to establish mass production capabilities and drive down costs through the operation of its large-scale demonstration plant, targeting broader market penetration. Tandem PV's success is poised to become a symbol of innovation in the U.S. clean energy industry, making a significant contribution to the global energy transition.

Source: #

Collected: June 05, 2026 | Automated Research System (Gemini API)

U.S. DOE Publishes Summary of Performance Targets for Perovskite PV R&D Programs

Published May 29, 2026 U.S. Department of Energy (DOE) USA



OVERVIEW

The U.S. Department of Energy's (DOE) Solar Energy Technologies Office (SETO) has released a summary of performance targets gathered through a Request for Information (RFI) for its perovskite PV research, development, and demonstration programs. The RFI solicited feedback from industry, academia, and research institutions on efficiency, stability, and reproducibility of perovskite PV devices. SETO aims to leverage these targets to coordinate community efforts, ensure the relevance of future funding programs, and accelerate the technical and commercial development and risk reduction of perovskite technology.

IN DEPTH

Key Findings

The U.S. Department of Energy's (DOE) Solar Energy Technologies Office (SETO) has published a summary of feedback received from its Request for Information (RFI) concerning performance targets for perovskite PV research, development, and demonstration programs. This pivotal document synthesizes expert insights from industry, academia, and research institutions regarding the efficiency, stability, and reproducibility of perovskite solar cell devices. SETO intends to strategically utilize these clarified performance targets to coordinate efforts across the research community, enhance the effectiveness of future funding programs, and ultimately accelerate the technical and commercial development of perovskite technology while mitigating associated risks.

Technical Details

The performance targets collected through the RFI include specific technical parameters such as:

- **Power Conversion Efficiency (PCE):** Target values for practical efficiency in large-area modules, beyond laboratory record efficiencies.
- **Long-Term Stability:** Numerical targets for performance degradation rates under harsh environmental conditions (e.g., high temperature, high humidity, UV irradiation, thermal cycling), aiming for, for example, 80% retention of initial efficiency over a 25-year warranty period.
- **Reproducibility:** Goals related to improving manufacturing yield and ensuring consistency in device performance across batches.
- **Material Safety and Sustainability:** Targets for the development of lead-free alternatives and enhanced recyclability.
- **Manufacturing Cost:** Cost reduction targets per unit of power generated ($/Wp).

These targets are crucial for perovskite solar cells to competitively enter the existing silicon solar cell market and function as reliable solutions across a wide range of applications.

Background & Context

Perovskite solar cells are globally recognized as a next-generation renewable energy technology due to their high theoretical efficiency and potential for low-cost manufacturing. However, the transition from laboratory to market requires overcoming multiple challenges related to technical reliability, manufacturability, and economic viability. SETO's RFI is a key mechanism to identify these challenges and align industry needs with R&D directions. Government agencies setting clear performance targets and basing funding decisions on them is highly effective in focusing R&D efforts and clarifying the path to commercialization. This initiative supports the national goal of the U.S. maintaining leadership in clean energy technologies and decarbonizing the electricity sector by 2035.

Strategic Significance & Outlook

SETO will use the performance targets established in this RFI as the foundation for designing and evaluating future funding programs. This is expected to enable research institutions, universities, and companies to pursue R&D more strategically and accelerate the development of market-demanded perovskite products. Ultimately, the goal is for perovskite solar cells to be widely adopted across diverse market segments, including Building-Integrated Photovoltaics (BIPV), flexible devices, and off-grid systems. Achieving these targets will play a crucial role in further reducing the cost of solar power and accelerating the deployment of renewable energy.

Source: https://www.energy.gov/cmei/systems/summary-performance-targets-perovskite-pv-research-development-and-demonstration

Collected: June 05, 2026 | Automated Research System (Gemini API)

MDPI Publishes Review on Ion Migration in 2D Organic–Inorganic Hybrid Perovskite Heterostructures, Elucidating Mechanisms for Enhanced Stability

Published June 03, 2026 MDPI Switzerland

OVERVIEW

MDPI has published a detailed review paper on interface evolution, migration mechanisms, and device implications of ion migration in 2D organic–inorganic hybrid perovskite (2D-OIHP) heterostructures. The review demonstrates that long-chain organic ligands in 2D perovskites act as effective barriers suppressing out-of-plane ion migration. This leads to higher vacancy formation energy and improved intrinsic ionic and structural stability compared to 3D perovskites, providing crucial insights for enhancing the long-term durability of perovskite solar cells.

IN DEPTH

Key Findings

The Multidisciplinary Digital Publishing Institute (MDPI) has released a comprehensive review paper on ion migration in two-dimensional organic–inorganic hybrid perovskite (2D-OIHP) heterostructures. The core finding of this research is that the long-chain organic ligands inherent in 2D perovskites act as effective barriers, suppressing out-of-plane ion migration, a primary cause of device degradation. This mechanism leads to higher vacancy formation energy compared to 3D perovskites, consequently enhancing intrinsic ionic and structural stability. This provides extremely vital implications for design strategies aimed at improving the long-term durability of perovskite solar cells.

Technical Details

Ion migration is a major factor contributing to efficiency loss and instability in perovskite solar cells. 2D-OIHP heterostructures, with their layered architecture, protect the 3D perovskite active layer from external factors like moisture and oxygen while physically restricting ion transport pathways. The review details how optimizing the energy band alignment at interfaces promotes charge carrier transport and reduces non-radiative recombination losses. It also analyzes the impact of varying lengths and structures of organic ligands on ion migration suppression, illustrating how specific ligands increase vacancy formation energy within the perovskite crystal lattice and enhance ion diffusion barriers. This has been confirmed to also improve the thermal and photostability of the devices.

Background & Context

Perovskite solar cells hold great promise as next-generation photovoltaics due to their high efficiency and potential for low-cost manufacturing, but their commercialization requires overcoming long-term stability challenges. Suppressing ion migration is one of the most critical research areas for resolving this issue. 2D perovskites and 2D/3D hybrid structures have recently gained attention as strong candidates to address this stability problem. This review paper synthesizes state-of-the-art knowledge in this field, systematically organizing ion migration mechanisms and the design principles for controlling them, thereby clarifying future R&D directions. This knowledge is indispensable for bringing more reliable perovskite solar cells to market.

Strategic Significance & Outlook

The insights gained from this review will form a foundation for accelerating the development of highly efficient and ultrastable perovskite solar cells. Specifically, in the design of 2D-OIHP heterostructures, further precise engineering of specific organic ligand selection and interlayer interfaces is expected to enable the realization of devices with practical service lifetimes. This research is critical for bridging the reliability gap in perovskite solar cell commercialization and will ultimately contribute to reducing the cost of solar power and accelerating the adoption of renewable energy. In the future, these highly stable perovskite materials also hold the potential for expanded applications in other optoelectronic devices such as LEDs, transistors, and detectors.

Source: #

U.S. DOE SETO Highlights Perovskite Solar Cell Manufacturing Competitiveness in 2022 Peer Review: Targets Cost Reduction and Domestic Manufacturing Expansion by 2025

Published May 29, 2026 U.S. Department of Energy (DOE) USA

OVERVIEW

The U.S. Department of Energy's (DOE) Solar Energy Technologies Office (SETO) has released a summary of its 2022 Peer Review on manufacturing and competitiveness. The review emphasizes funding for projects supporting both mature (silicon PV) and emerging (perovskite PV) solar technologies. Specifically for perovskite PV, the focus is on identifying opportunities to reduce technological risks and enable faster scale-up and deployment. SETO aims to further reduce solar electricity costs and expand domestic manufacturing capacity by 2025.

IN DEPTH

Key Findings

The U.S. Department of Energy's (DOE) Solar Energy Technologies Office (SETO) has published a summary of its 2022 Peer Review on manufacturing and competitiveness. This review evaluates the strategic direction of photovoltaic technologies to meet U.S. clean energy goals. A key finding emphasized that SETO is funding projects that support both mature silicon PV technologies and emerging technologies like perovskite solar cells. For perovskite PV specifically, the focus is on identifying concrete opportunities to reduce technological risks and enable quicker scale-up and market deployment. SETO has set ambitious targets to further reduce solar electricity costs and expand domestic manufacturing capacity by 2025.

Technical Details

The peer review discussed in detail the bottlenecks in perovskite solar cell manufacturing processes and technological innovations required to overcome them. This includes the development of manufacturing techniques suitable for large-scale production, such as roll-to-roll printing and slot-die coating, as well as material cost reduction and long-term device reliability improvements. SETO provides funding for R&D to enhance manufacturing maturity, supporting the transition of laboratory-level results to factory-level production. The goal is for perovskite solar cell modules to become competitive with existing PV technologies in terms of performance, cost, and durability. Furthermore, strengthening domestic manufacturing capacity is planned to contribute to supply chain resilience and enhanced energy security.

Background & Context

The U.S. is strongly promoting the adoption of solar power to accelerate its transition to a clean energy economy and strengthen climate action. In this context, perovskite solar cells are seen as a potentially game-changing technology due to their high efficiency and potential for low-cost manufacturing. However, their commercialization requires establishing manufacturing processes and proving long-term reliability. SETO's peer review indicates that the government recognizes these challenges and is seeking solutions through appropriate funding and policy support. Strengthening domestic manufacturing capacity will also lead to job creation and economic growth, which are crucial elements for maintaining U.S. technological leadership.

Strategic Significance & Outlook

SETO will further refine its perovskite solar cell R&D and manufacturing support programs based on the recommendations identified in the peer review. Future funding opportunities are likely to focus specifically on scalable manufacturing techniques, durability enhancement, and cost reduction. Progress towards the 2025 targets will demonstrate that perovskite solar cells can significantly contribute to the U.S. energy mix, ultimately playing an indispensable role in achieving the national goal of 100% clean electricity for the power sector by 2035. This strategic approach is expected to accelerate the market introduction of perovskite solar cells and drive the clean energy revolution.

Source: https://www.energy.gov/cmei/systems/2022-seto-peer-review-manufacturing-competitiveness-review-summary

Collected: June 05, 2026 | Automated Research System (Gemini API)

arXiv Paper Reviews Novel Advantages of Nano- and Micro-Textures for Multi-Faceted Performance Enhancement in Perovskite Solar Cells

Published May 29, 2026 arXiv

OVERVIEW

A paper published on arXiv reviews novel advantages of nano- and micro-textures in perovskite solar cells. These include improved film wettability from perovskite solutions, enhanced crystallinity, intensified charge carrier extraction, and increased mechanical stability in flexible devices. These texturing technologies also contribute to improved efficiency in perovskite-silicon tandem solar cells, highlighting their role as indispensable design strategies for next-generation solar cell performance.

IN DEPTH

Key Findings

The paper 'More than just light management – The multiple advantages of nano- and micro-textures in perovskite solar cells,' published on arXiv, provides a comprehensive review of novel benefits derived from nano- and micro-texturing technologies for multi-faceted performance enhancement in perovskite solar cells. This research reveals that these textures not only contribute to light management but also improve the perovskite film formation process, enhance material crystalline quality, facilitate efficient charge carrier extraction, and bolster the mechanical stability of flexible devices. These combined advantages significantly contribute to the overall efficiency improvement of perovskite-silicon tandem solar cells, positioning them as a critical element in next-generation solar cell design.

Technical Details

Nano- and micro-texturing involves introducing fine structures onto substrate surfaces. The review highlights specific advantages:

- **Improved Film Wettability:** Textured surfaces enhance the wettability of perovskite solutions, promoting the formation of more uniform and defect-free perovskite films, which is crucial for reproducible large-area manufacturing.
- **Enhanced Crystallinity:** Textures at interfaces control perovskite crystal nucleation and growth, leading to the formation of larger, more stable crystalline grains, which in turn improves device stability and efficiency.
- **Enhanced Charge Carrier Extraction:** The textured structures shorten the path for photogenerated charge carriers to reach electrodes and reduce recombination losses, thereby increasing current density and power conversion efficiency.
- **Improved Mechanical Stability:** Especially in flexible perovskite solar cells, textures contribute to stress distribution, enhancing the device's resilience to bending and stretching. This ensures the long-term reliability of flexible devices.

These effects also boost the overall device performance in perovskite-silicon tandem solar cells by improving the efficiency and stability of the top perovskite layer.

Background & Context

Perovskite solar cells are gaining significant attention as a next-generation photovoltaic technology due to their high efficiency and potential for low-cost manufacturing. However, their commercialization requires overcoming challenges in stability, reproducibility, and large-scale production. Nano- and micro-texturing technologies offer a multifaceted approach to address these issues. While traditional texturing primarily focused on light management (light trapping effects), this review demonstrates its profound contributions to material science and electrochemical aspects, expanding the design philosophy of perovskite solar cells. This technology could be relatively easily integrated into existing manufacturing processes, making it an attractive option for the industry.

Strategic Significance & Outlook

Nano- and micro-texturing is a highly promising strategy for improving the performance and durability of perovskite solar cells, and further R&D in this area is expected to accelerate. Specifically, research into developing low-cost, scalable texturing methods and optimizing texture designs for specific applications (e.g., BIPV, wearable devices) is anticipated. The widespread adoption of this technology will expedite the practical application of perovskite solar cells and, by improving the cost-effectiveness of solar power, is expected to make significant contributions to the global clean energy transition. In the future, these textured structures may also find applications in improving the performance of other optoelectronic devices such as perovskite LEDs and sensors.

Source: https://arxiv.org/abs/2605.18431

Five Major Japanese Companies Launch 'Japan Perovskite Solar Cell Promotion Council (JPSC)' to Accelerate Domestic Adoption and Strengthen International Competitiveness

Published May 28, 2026 PV Magazine Germany

OVERVIEW

Five leading Japanese companies—Aisin, EneCoat Technologies, Sekisui Solar Film, Panasonic Holdings, and Ricoh—have reportedly established the 'Japan Perovskite Solar Cell Promotion Council (JPSC).' This new organization aims to accelerate the domestic adoption of perovskite solar cells and enhance Japan's international competitiveness. JPSC plans to work on safety and quality assurance certifications, product standardization, supply chain establishment, and research into recycling methods, strongly promoting the full-scale introduction of perovskite technology in Japan.

IN DEPTH

Key Findings

Five major Japanese corporations—Aisin, EneCoat Technologies, Sekisui Solar Film, Panasonic Holdings, and Ricoh—have announced the joint establishment of the 'Japan Perovskite Solar Cell Promotion Council (JPSC).' This newly formed industrial alliance aims to significantly accelerate the adoption of perovskite solar cell (PSC) technology within Japan and simultaneously bolster Japan's competitiveness in the international market. JPSC intends to address a wide range of critical issues, including product safety and quality assurance certification, standardization of product specifications, establishment of robust supply chains, and research into sustainable recycling methods.

Technical Details

The primary technical and industrial challenges JPSC will tackle include:

- **Establishing Safety and Quality Assurance:** Developing certification systems to dispel safety concerns, particularly regarding lead content in perovskite materials, and to ensure long-term reliability. This is crucial for building confidence among consumers and installers.
- **Product Standardization:** Establishing standard specifications for module size, electrical characteristics, and testing methods to facilitate domestic and international product deployment. This will improve compatibility and promote market expansion.
- **Supply Chain Establishment:** Strengthening domestic and international supply chains to ensure a stable supply of materials required for perovskite solar cell manufacturing (e.g., organic solvents, transparent conductive films) and to reduce costs.
- **Research on Recycling Methods:** Developing recycling technologies for end-of-life perovskite solar cells, considering the entire product lifecycle. This will minimize environmental impact and build a sustainable industrial structure.

These initiatives will form the foundation for perovskite solar cells to genuinely enter the existing photovoltaic market and open up new applications.

Background & Context

Perovskite solar cells are globally anticipated as a next-generation renewable energy technology due to their high efficiency, potential for low-cost manufacturing, and thin, lightweight, and flexible properties. The Japanese government, through initiatives like the Green Innovation Fund led by the Ministry of Economy, Trade and Industry, is also strengthening its support for perovskite technology. The establishment of JPSC indicates that, in conjunction with such policy support, Japanese industry has initiated concrete actions to remove barriers to market introduction, not just technological development. Particularly in applications where conventional mega-solar installations are difficult (e.g., building facades, curved surfaces), Building-Integrated Photovoltaics (BIPV) utilizing perovskite solar cells hold great potential and will contribute to expanding the domestic market.

Strategic Significance & Outlook

JPSC's activities are expected to significantly accelerate the adoption of perovskite solar cells in Japan. Product standardization and enhanced reliability will facilitate commercial deployment both domestically and internationally, laying the groundwork for Japanese technology to gain an advantage in the global market. The Ministry of Economy, Trade and Industry also intends to support the overseas expansion of perovskite solar cells through demonstration projects in emerging industrial parks in Southeast Asia and advanced cities in Europe and the U.S., leveraging the Green Innovation Fund, thus strengthening international cooperation. The establishment of this council is a critical step for Japan to demonstrate leadership in clean energy technologies and contribute to global decarbonization.

Source: https://www.pv-magazine.com/2026/05/28/five-japanese-companies-launch-jpsc-alliance-to-accelerate-perovskite-solar-adoption/

Chinese Researchers Develop Dynamic Molecular Sunscreen for Perovskite Solar Cells, Achieving 24.71% Efficiency and 96.9% Stability After 1000 Hours by Suppressing UV Degradation

Published June 02, 2026 EurekAlert! China

OVERVIEW

Chinese researchers have developed a groundbreaking strategy to suppress UV-induced degradation, a key challenge for long-term stability in perovskite solar cells. By incorporating photoisomeric BTTM molecules within the perovskite layer, they achieved ion immobilization and UV degradation suppression. This improved device reached a high power conversion efficiency of 24.71% and maintained an exceptional stability of 96.9% of its initial efficiency after 1,000 hours of continuous operation, marking a significant step towards perovskite solar cell commercialization.

IN DEPTH

Key Findings

A Chinese research team has developed a groundbreaking strategy to overcome ultraviolet (UV)-induced degradation, which has been a primary barrier to the long-term stability of perovskite solar cells. They introduced a photoisomeric molecule, BTTM (bis-(thienothiophene)-methane), into the perovskite layer, which functions as a 'dynamic molecular sunscreen.' This molecule effectively immobilizes ions and suppresses the decomposition of perovskite material caused by UV light. Through this novel approach, the improved perovskite solar cells achieved a high power conversion efficiency (PCE) of 24.71% and successfully maintained remarkable stability, retaining 96.9% of their initial efficiency after 1,000 hours of continuous maximum power point (MPP) operation. This marks a significant advance toward the practical application of perovskite solar cells.

Technical Details

The photoisomeric BTTM molecule undergoes a structural change when exposed to UV light, which increases its ability to trap ion vacancies within the perovskite material. This suppresses 'ion migration,' where ions move freely and degrade device performance. Additionally, the BTTM molecule itself absorbs UV light and dissipates it as harmless heat, directly reducing UV damage to the perovskite layer. This dual mechanism significantly enhances the device's photostability and long-term durability. The study demonstrated that degradation was markedly suppressed in devices incorporating BTTM compared to control devices without it. This technology has the potential to be relatively easily integrated into existing perovskite manufacturing processes like spin coating and printing, suggesting scalability for mass production.

Background & Context

Perovskite solar cells are globally recognized as a next-generation photovoltaic technology due to their high efficiency and potential for low-cost manufacturing, surpassing silicon solar cells. However, one of their biggest challenges has been insufficient long-term stability due to degradation from heat, moisture, and particularly UV light. UV light is known to disrupt the crystal structure of perovskite materials and accelerate ion migration. This Chinese research provides an innovative solution to the UV degradation problem, which is critically important for extending the practical lifespan of perovskite solar cells. This breakthrough is an indispensable element for perovskite technology to cross the 'valley of death' of commercialization and establish the reliability needed for widespread adoption.

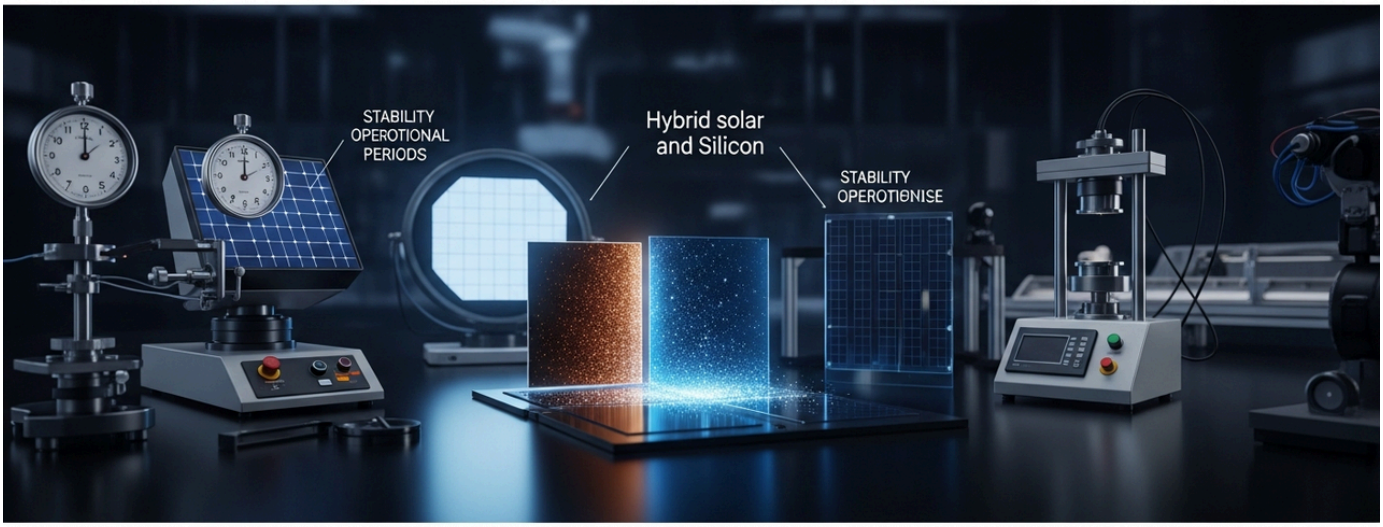
Strategic Significance & Outlook

This dynamic molecular sunscreen technology is poised to be a powerful tool for accelerating the commercialization of perovskite solar cells. The 24.71% efficiency and 96.9% stability after 1,000 hours provide strong validation for deployment in practical environments. The research team plans to continue optimizing molecular design, aiming for even longer-term stability and higher efficiency. If this technology is scaled up for mass production, it is expected to significantly improve the cost-effectiveness of perovskite solar cells and promote their adoption in diverse applications such as Building-Integrated Photovoltaics (BIPV), portable devices, and flexible electronics. This holds the potential to make a substantial contribution to global energy transition and decarbonization goals.

Source: https://www.eurekalert.org/news-releases/1046467

Chinese Researchers Achieve 33% Efficiency and 90% Stability After 1000 Hours in Perovskite-Silicon Tandem Solar Cells, Ensuring Compatibility with Mass Production Lines

Published June 01, 2026 CPG Click Petróleo e Gás | Solar Now China



OVERVIEW

Chinese researchers have achieved 33% conversion efficiency in perovskite-silicon tandem solar cells. The most significant advancement of this technology is a substantial improvement in durability, maintaining approximately 90% of its initial performance after 1,000 hours of continuous operation. This breakthrough is compatible with existing industrial production lines and is expected to accelerate the commercial application of multi-junction perovskite and silicon solar cells, making the market introduction of next-generation solar cells a tangible reality.

IN DEPTH

Key Findings

Chinese researchers have achieved a remarkable 33% power conversion efficiency (PCE) in an innovative tandem solar cell combining perovskite and silicon. The most critical aspect of this achievement is not merely the high efficiency, but a significant enhancement in durability. Specifically, the device demonstrated excellent stability, retaining approximately 90% of its initial performance after 1,000 hours of continuous operation. This breakthrough also boasts high compatibility with existing industrial production lines, which is expected to dramatically accelerate the commercial application of multi-junction perovskite and silicon solar cells. This clearly signals that the market introduction of next-generation solar cells has become a tangible reality.

Technical Details

This high-efficiency tandem solar cell maximizes the utilization of different solar light wavelengths by stacking a transparent perovskite layer on top of an optimized silicon cell. The 33% efficiency was achieved through advancements in interface engineering, optimized perovskite material composition, and improved charge transport layers. For durability, particular emphasis was placed on stabilizing the perovskite layer and enhancing its moisture and oxygen barrier properties. Researchers effectively suppressed ion migration and photo-degradation using proprietary additives and encapsulation techniques, ensuring long-term stability even under harsh conditions. The technology is designed to be easily integrated with existing silicon solar cell manufacturing infrastructure, requiring no major modifications to production equipment, thus enabling rapid mass production.

Background & Context

Perovskite solar cells are anticipated as a next-generation technology poised to surpass the limitations of conventional silicon solar cells, offering high efficiency and the potential for low-cost manufacturing. The perovskite-silicon tandem structure, in particular, is the most promising approach for achieving efficiencies unattainable with single materials. China leads the world in solar power R&D and manufacturing, and this achievement further solidifies its technological advantage. This breakthrough demonstrates that perovskite technology is overcoming the critical durability issues that were major barriers to commercialization, providing a crucial technological foundation for accelerating the global energy transition. Compatibility with existing production lines is highly attractive to investors and industry, as it can significantly reduce time-to-market and costs.

Strategic Significance & Outlook

This Chinese-led technology holds the potential to accelerate the commercialization of perovskite-silicon tandem solar cells and dramatically improve the cost-effectiveness of solar power. The 33% efficiency and 90% stability after 1,000 hours provide strong validation for adoption across a wide range of applications, including residential, commercial, and utility-scale power plants. Crucially, the ability to utilize existing manufacturing infrastructure will enable rapid market deployment. If widely adopted, this technology is expected to expand solar energy's share in the global energy mix and significantly contribute to achieving renewable energy targets. This marks a groundbreaking step towards realizing a global decarbonized society.

Source: https://solarnow.com.br/one-of-the-most-promising-solar-technologies-in-the-world-has-just-made-a-leap-in-china-researchers-combined-perovskite-and-silicon-to-convert-33-of-light-into-energy-and-most-importantly-made-the-cell-last-maintaining-90-of-the-yield-after-a-thousand-ho/

Collected: June 05, 2026 | Automated Research System (Gemini API)

Kaneka Plans Perovskite Tandem Solar Cell Product Release by FY2028: Leveraging NEDO Green Innovation Fund for BIPV Rooftop Tile Module Demonstration

Published June 05, 2026 Kaneka Japan

OVERVIEW

Kaneka announced its plan to release perovskite solar cell products by fiscal year 2028, positioning perovskite technology as a key theme in its new 'Three-Year Initiatives 2026' medium-term management plan. Through a NEDO Green Innovation Fund project, the company is pursuing both high efficiency and long-term reliability in tandem structures. Notably, a demonstration project for roof-tile integrated modules of tandem perovskite solar cells for residential use is underway, potentially revolutionizing Japan's Building-Integrated Photovoltaics (BIPV) market.

IN DEPTH

Key Findings

Kaneka has announced its strategic focus on the development of perovskite solar cell technology, a next-generation photovoltaic solution, within its new medium-term management plan, 'Three-Year Initiatives 2026,' with a target product release by fiscal year 2028. The company is leveraging the New Energy and Industrial Technology Development Organization (NEDO)'s Green Innovation Fund project to address the critical challenges of achieving both high efficiency and long-term reliability in tandem structures. A particularly notable initiative is the demonstration project for roof-tile integrated modules of tandem perovskite solar cells for residential use, aiming to integrate photovoltaics seamlessly with building materials and bring new value to Japan's energy landscape.

Technical Details

Kaneka's perovskite solar cells are being developed by integrating the company's long-standing expertise in organic thin-film technology with advanced perovskite materials science. The tandem structure involves stacking perovskite layers with other solar cells (e.g., silicon) to efficiently absorb different wavelengths of light, achieving higher power conversion efficiencies than single-junction cells. The NEDO project specifically targets a combination of high efficiency exceeding 20% and long-term reliability of over 20 years. Building-Integrated Photovoltaic (BIPV) modules, which integrate directly into roofing tiles, are expected to see significant adoption in urban areas and residential markets as they enable solar power generation without compromising architectural aesthetics. Kaneka is focusing on technological development to achieve lightweight, flexible, and highly design-compatible modules that are easy to install on existing buildings.

Background & Context

Japan needs to accelerate the adoption of renewable energy to improve its energy self-sufficiency and achieve its 2050 carbon neutrality goal. Perovskite solar cells are considered an indispensable technology for meeting these targets due to their high potential. Kaneka has a track record in developing thin-film solar cells, such as amorphous silicon, and aims to leverage this experience in perovskite technology to establish a market advantage. Government support through the Green Innovation Fund provides an incentive for companies to invest in high-risk new technology development, fostering overall technological innovation in Japan. The BIPV market, in particular, is expected to see substantial growth with the promotion of Zero Energy Buildings (ZEB) and Zero Energy Homes (ZEH).

Strategic Significance & Outlook

Kaneka's plan to release perovskite tandem solar cell products by fiscal year 2028 represents a significant step towards transforming its business structure and establishing leadership in Japan's renewable energy market. The success of the residential roof-tile integrated module demonstration project could set a new standard in the BIPV market and significantly impact the construction industry. In the future, these technologies are expected to expand their application scope to commercial and public facilities, and even the mobility sector. This strategy by Kaneka is anticipated to accelerate the spread of solar power and contribute to the realization of a sustainable society, while also enhancing the company's corporate value.

Source: https://www.kaneka.co.jp/ir/library/pdf/e_2026_plan.pdf

Tandem PV Secures $36M, Fully Funds 40MW Demonstration Plant, and Begins Shipping U.S.-Made T20 Tandem Modules, Targeting Over 30% Efficiency

Published June 03, 2026 Latitude Media USA

OVERVIEW

Tandem PV has developed technology to boost efficiency above 30% by layering a proprietary perovskite film onto silicon solar cells, accelerating its market entry. The company secured approximately $36 million in Series A funding, fully funding a 40-megawatt (MW) demonstration plant. Tandem PV has now commenced shipping its U.S.-made T20 tandem modules to utility-scale customers, marking a significant milestone in the commercialization of perovskite-silicon tandem technology.

IN DEPTH

Key Findings

Tandem PV has developed an innovative technology that layers a proprietary perovskite film onto existing silicon solar cells, successfully boosting efficiency to over 30%. The company secured approximately $36 million in a Series A funding round, fully capitalizing a 40-megawatt (MW) demonstration plant. Furthermore, Tandem PV has already begun shipping its U.S.-made 'T20' tandem modules to utility-scale customers, which clearly indicates that perovskite-silicon tandem technology is transitioning from the laboratory to a full commercial phase.

Technical Details

Tandem PV's technology boasts a significant advantage in its compatibility with standard silicon solar cell manufacturing processes, allowing it to leverage existing infrastructure. By forming a thin perovskite layer on top of a silicon substrate, the device efficiently absorbs different wavelengths of sunlight, achieving power conversion efficiencies unattainable with single-junction solar cells. Specifically, efficiencies exceeding 30% significantly surpass the current commercial efficiency limits of monocrystalline silicon solar cells. The company's 'T20' modules are designed for both high performance and durability, with long-term field performance also being validated. The 40MW demonstration plant will play a critical role in establishing mass production techniques, optimizing manufacturing costs, and refining quality control processes, serving as an important step towards future large-scale production.

Background & Context

Perovskite-silicon tandem solar cells are gaining attention as a next-generation renewable energy technology with the potential to break through the efficiency limits of conventional silicon solar cells and dramatically improve the cost-effectiveness of solar power. Tandem PV's origins lie in co-founder and CTO Colin Bailie's development of the world's first perovskite-silicon tandem solar cell at Stanford University, followed by its establishment through the U.S. Department of Energy (DOE)'s Activate accelerator program. This background suggests that the company's technology is underpinned by a robust scientific foundation and strategic government support. As the U.S. seeks to establish leadership in clean energy technologies, the success of domestic companies like Tandem PV in achieving mass production will also contribute to energy security and supply chain resilience.

Strategic Significance & Outlook

The recent funding, securing of the demonstration plant, and commencement of T20 module shipments clearly indicate Tandem PV's pioneering role in the commercialization of perovskite-silicon tandem technology. Through the operation of its demonstration plant, the company will aim to further reduce production costs and improve product reliability and durability, thereby expanding its market share. In the future, these high-efficiency modules are expected to be widely adopted in various applications, including residential rooftops, commercial buildings, and large-scale solar farms. Tandem PV's success will play a crucial role in significantly reducing the cost of solar power and accelerating the global energy transition.

Source: https://www.latitudemedia.com/articles/the-perovskite-bet-that-could-transform-solar

Collected: June 05, 2026 | Automated Research System (Gemini API)

Japanese Government to Deregulate Perovskite Solar Cell Installation by FY2026, Clarifying BIPV Design Standards and Easing Three Major Regulations

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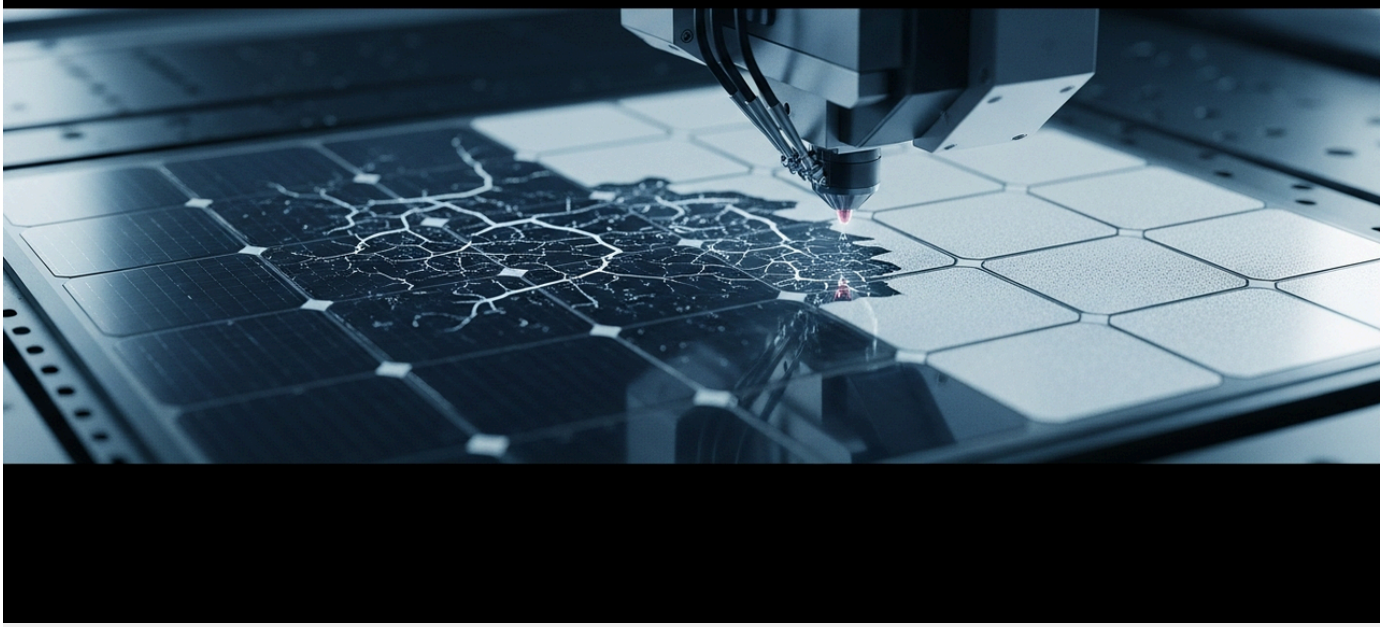

OVERVIEW

The Japanese government aims to review and implement measures within fiscal year 2026 to ease key regulations hindering the adoption of next-generation solar cells, including perovskites. Noteworthy measures include clarifying design standards for Building-Integrated Photovoltaics (BIPV) and easing environmental regulations under the Factory Location Act. Analysts expect these deregulation efforts to provide a significant boost for construction companies and power producers, accelerating the widespread adoption of perovskite solar cells crucial for Japan's decarbonization goals and energy self-sufficiency.

IN DEPTH

Key Findings

The Japanese government has finalized plans to implement fundamental reviews and specific measures concerning key regulations that currently impede the domestic introduction and widespread adoption of next-generation solar cells, including perovskite solar cells, by the end of fiscal year 2026 (March 2027). Three major deregulation efforts are particularly noteworthy:

- **Review of Safety Measures for Hazardous Material Facilities:** Streamlining regulations concerning trace amounts of lead in perovskite solar cells to align with actual risks.
- **Changes to Area Calculation Standards under the Factory Location Act:** Acknowledging 'vertical projection area' in addition to the conventional horizontal projection area for film-type solar cells installed on factory walls.
- **Clarification of BIPV (Building-Integrated Photovoltaics) Design Standards:** In cooperation with the Ministry of Land, Infrastructure, Transport and Tourism, clarifying the rules for how BIPV products apply under the Building Standards Act and the Electricity Business Act.

These measures are anticipated to simplify the installation of perovskite solar cells for construction companies and power producers, providing a strong impetus for market expansion.

Technical Details

Currently, perovskite solar cells, due to their lightweight, thin, and flexible properties, are expected to find applications in locations where conventional silicon solar cells are difficult to install, such as building facades, curved roofs, and structures with low load-bearing capacity. However, regulations like the 'horizontal projection area' standard for solar power generation equipment under the Factory Location Act were often unsuitable for film-type perovskite solar cells installed vertically. Additionally, BIPV products, possessing aspects of both building materials and power generation equipment, faced regulations under both the Building Standards Act and the Electricity Business Act, leading to complex design and installation processes. This deregulation directly addresses these technical and legal challenges, promoting the adoption of perovskite solar cells in various forms. The review of safety measures aims to reduce unnecessary regulatory burdens while aligning with international safety standards.

Background & Context

Japan must accelerate the introduction of renewable energy to achieve its 2050 carbon neutrality goal and enhance energy self-sufficiency. Solar power is a key pillar, but land availability constraints pose a challenge. Perovskite solar cells are seen as a trump card to solve this issue, and the government also supports R&D through initiatives like the 'Green Innovation Fund.' This deregulation represents a policy approach to remove market barriers in parallel with technological development, contributing significantly to Japan's energy security, decarbonization targets, and improved international competitiveness. Notably, as domestic companies like Sekisui Chemical advance the commercialization of flexible perovskite solar cells, government support is highly timely.

Strategic Significance & Outlook

The implementation of regulatory easing within FY2026 is expected to significantly accelerate the market introduction and diffusion of perovskite solar cells. The BIPV market, in particular, is projected to see substantial growth, potentially promoting adoption not only in factories and commercial facilities but also in general residences. This could lead to a dramatic increase in Japan's solar power generation capacity and a higher proportion of renewable energy in the energy mix. The government plans to continue reviewing regulations in line with technological innovation and market needs, vigorously promoting the societal implementation of clean energy technologies. This will help Japan solidify its position as a leading clean energy nation and contribute to the global energy transition.

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SNEC 2026: GCL Perovskite Announces 'Dual Record Breakthrough' on 2042cm^2 Module, Signaling Accelerated Industry Shift Towards Mass Production

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OVERVIEW

At SNEC 2026, GCL Perovskite officially announced a 'dual record breakthrough' in efficiency for its large 2042cm^2 perovskite module. The event, which saw over 20 companies including JinkoSolar, Trina Solar, and Tongwei unveil new PV modules, highlights the accelerating industry trend towards the mass production of perovskite technology. This indicates active development of technologies that combine high efficiency with large scale, suggesting that perovskite solar cells are nearing full entry into the existing photovoltaic market.

IN DEPTH

Key Findings

At SNEC 2026, one of the world's largest photovoltaic exhibitions held in Shanghai, GCL Perovskite officially announced a 'dual record breakthrough' in efficiency for its large perovskite module measuring 2042 cm^2. This achievement signifies overcoming the challenge of efficiency degradation with increased area and demonstrates the technological maturity of perovskite solar cells towards mass production. At the same event, more than 20 companies, including major players like JinkoSolar, Trina Solar, and Tongwei, unveiled their latest PV modules, clearly indicating an accelerating industry trend towards the full commercial deployment of perovskite technology.

Technical Details

While specific numerical details of GCL Perovskite's 'dual record breakthrough' have not yet been publicly disclosed, it is speculated, based on previous research, that it implies achieving both high efficiency and large area, alongside improved stability. Key to this would be uniform perovskite layer deposition techniques, interface passivation, and the development of efficient charge transport layers. The attainment of high efficiency in large modules likely reflects advancements in manufacturing technologies suitable for roll-to-roll production, such as slot-die coating and blade coating. Furthermore, many companies presented perovskite-silicon tandem modules, indicating a common industry strategy to enhance efficiency through integration with conventional silicon technologies. These technological aspects are indispensable for the commercialization of perovskite solar cells, addressing both cost reduction and long-term reliability.

Background & Context

China has established leadership in all aspects of the global solar photovoltaic market: research and development, manufacturing, and deployment. Perovskite solar cells, as a next-generation technology with the potential to surpass the theoretical efficiency limits of silicon solar cells, have received significant investment from both the Chinese government and corporations. SNEC serves as an international platform to showcase the latest technologies and market trends in this sector, and the strong presence of Chinese companies underscores their serious commitment to commercializing perovskite technology. The dual achievement of large area and high efficiency is crucial for entry into utility-scale power plants and Building-Integrated Photovoltaics (BIPV) markets, strongly emphasizing the industry's shift from laboratory research to factory production.

Strategic Significance & Outlook

The announcements by GCL Perovskite and many major companies at SNEC 2026 suggest that perovskite solar cells are poised for full market entry within the next few years. Progress in both high efficiency and large scale will further improve the cost-effectiveness of solar power and accelerate the adoption of renewable energy. Chinese companies are expected to play a leading role in the global energy transition by pursuing technological innovation and economies of scale. Moving forward, the key to market success will be the demonstration of long-term reliability in real-world environments and obtaining international certifications for these modules. This will allow perovskite solar cells to establish their position as major players in the global clean energy mix.

Source: https://www.energytrend.com/news/20260605-33246.html

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