

NEWS RELEASE

Singapore, 2 Oct 2026

NTU Singapore launches CRIMSON-1 satellite to test next-gen perovskite solar cells and AI computing in space

The mission will evaluate how lightweight perovskite solar technology and on-orbit AI-based image processing perform in extreme environments

Nanyang Technological University, Singapore (NTU Singapore) has successfully launched a satellite carrying pioneering perovskite solar cells developed locally for testing in space, together with artificial intelligence (AI) capabilities designed to analyse images directly in orbit.

The CRIMSON-1 satellite will gather real-world performance data on lightweight perovskite solar cells in the harsh environment of space, while also testing technologies that could help future spacecraft analyse raw data before beaming it back to Earth.

CRIMSON-1 is NTU's 14th satellite launched into space and it is among the first projects supported by the **National Space Agency of Singapore (NSAS)** under Singapore's Space Access Programme (SAP) as part of the national Space Technology Development Programme.

The programme gives Singapore researchers and companies opportunities to test technologies such as advanced materials, solar cells and edge computing systems in orbit, build flight heritage and shorten the path from laboratory development to space validation.

The satellite is also supported by the **Infocomm Media Development Authority (IMDA)**, which secured satellite spectrum and orbital resources from the International Telecommunication Union for its operation.

CRIMSON-1 was launched aboard a SpaceX Falcon 9 rocket on the Transporter-18 rideshare mission from Vandenberg Space Force Base in California, United States, on 1 October.

Scientists from the **NTU Satellite Research Centre (SaRC)** worked with launch integrator **Exolaunch**, which provided launch capacity, mission management, satellite integration and deployment services, to deploy the satellite into space using its EXOpod Nova system.

Ms Ngiam Le Na, Chief Executive of the National Space Agency of Singapore, said: “Perovskite solar cells will provide a compelling advantage over conventional solar panels – their thin, lightweight properties make them particularly well-suited for space applications, where every gram matters. Missions like CRIMSON-1 represent a pathway for homegrown innovations to gain flight heritage needed to progress towards commercial application. By giving our researchers and companies the opportunity to test and validate their technologies in orbit, we are helping them build the credibility and track record needed to compete in the global space economy.”

Since 2022, the Singapore government has set aside S\$210 million under the Space Technology Development Programme to support research and development in space technologies and build national capabilities.

NTU Deputy President and Provost Professor Christian Wolfrum said: “CRIMSON-1 carries next-generation perovskite solar cells and edge AI computing into orbit. These technologies can only be validated under real space conditions, and this is what NTU's satellite programme has been doing for three decades. CRIMSON-1 is our fourteenth mission.”

“What makes this possible is that NTU brings satellite engineering, artificial intelligence, and advanced materials research together in one place. The satellite was developed with local industry partners, so each mission builds capability not just in the university but across Singapore's space sector.”

Testing pioneering perovskite solar cells in orbit

CRIMSON-1 will test several **next-generation perovskite solar cells** developed by NTU researchers and **Singfilm Solar**, a deep-tech spin-off from **National University of Singapore (NUS)**.

Perovskites are a class of next-generation materials that can be used to make lightweight solar cells with high power-generation efficiency using commonly available materials.

NTU has been a pioneer in perovskite solar cell research since a landmark *Science* paper in 2013¹, when a team showed that electrical charges could travel unusually

¹ Xing, G., Mathews, N., Sun, S., Lim, S. S., Lam, Y. M., Grätzel, M., Mhaisalkar, S., & Sum, T. C. (2013). Long-range balanced electron- and hole-transport lengths in organic-inorganic CH₃NH₃PbI₃. *Science*, 342(6156), 344–347. <https://doi.org/10.1126/science.1243167>

long distances through perovskite materials, helping to explain their high solar-cell efficiency.

Since then, NTU researchers have scaled up perovskite solar cells towards module sizes² suitable for industry applications and developed prototypes aimed at improving their performance and stability.

However, for space applications, new solar technologies must prove that they can survive the physical stresses of a rocket launch and endure the harsh conditions of space while generating consistent power.

CRIMSON-1 will test the cells' physical durability and efficiency after their journey from the ground into space and measure how much electrical power they generate in Low Earth Orbit.

The mission also marks the first time Singfilm's technology will be flown in space, providing data that could support further development and validation of its solar technology for space applications.

NUS Assistant Professor Hou Yi, Founder of Singfilm Solar, said: "This mission marks the first spaceflight of a flexible perovskite solar module built on ultrathin glass and the first deployment of a Singapore-made solar module in orbit. It will provide valuable data on how our technology performs in the harsh environment of space, helping us advance lightweight solar power for future satellites and explore its application for space-based AI data centres."

Building on NTU's satellite achievements

Leading the mission is the **NTU Satellite Research Centre (SaRC)**, the birthplace of Singapore's satellite and space programmes. It is one of the few university-based centres globally that has developed end-to-end capabilities spanning spacecraft engineering, launch preparation, mission control and in-orbit operations.

Since the launch of X-SAT, Singapore's first locally built satellite, in 2011, NTU has designed, built, tested and operated satellites ranging from small CubeSats to larger spacecraft and has launched 14 satellites into space.

Most recently, VELOX-AM, NTU's 13th satellite launched in July 2023, completed its mission and deorbited in August 2026. Data and learnings from past missions have

² *Scaled-up perovskite solar cells developed by NTU Singapore scientists achieve highest recorded power conversion* (14 July 2020). <https://www.ntu.edu.sg/news/detail/scaled-up-perovskite-solar-cells-developed-by-ntu-singapore-scientists-achieve-highest-recorded-power-conversion>

helped pave the way for CRIMSON-1 and NTU's ongoing development of future satellite operations.

Complementing SaRC's satellite engineering capabilities, NTU's **Earth Observatory of Singapore (EOS)** applies satellite data to real-world challenges, from developing rapid maps of earthquakes, floods and other disasters to monitoring climate change and land sinking.

Developing AI for future satellite operations

Another CRIMSON-1 experiment will test **edge AI computing**, where data collected by a satellite is analysed directly on board instead of transmitting all the raw images back to Earth, which takes time and bandwidth.

During the mission, the satellite will run AI-based image-processing tasks in orbit while researchers study how well its computing system manages heat and power consumption under heavy workloads.

Analysing images in space could allow future satellites to identify useful information before transmitting data to Earth, reducing the amount of raw data sent through limited satellite communications links.

While CRIMSON-1 is testing AI processing in orbit, SaRC is also exploring how AI could help manage growing numbers of satellites from the ground.

Earlier this year, NTU and Japanese technology company Fusic Co., Ltd. announced a collaboration to explore AI-enabled ground systems that could assist satellite operators with mission scheduling, ground-station allocation, routine operations and earlier detection of technical problems.

Together, the two efforts will examine how AI could support both sides of future satellite operations: processing information autonomously aboard spacecraft and helping human operators manage missions from Earth.

###

Media contact:

Lester Kok
Senior Assistant Director
Corporate Communications Office
Nanyang Technological University, Singapore
Email: lesterkok@ntu.edu.sg

About Nanyang Technological University, Singapore

Nanyang Technological University, Singapore (NTU Singapore) is a premier technological university that develops leaders and creates societal impact through education, research, and service.

Ranked amongst the world's top universities, NTU has 40,000 undergraduate and postgraduate students in the Business, Computing & Data Science, Engineering, Humanities, Arts, & Social Sciences, Medicine, Science, and Graduate colleges.

NTU is also home to world-renowned autonomous institutes – the National Institute of Education and S Rajaratnam School of International Studies – and various leading research centres such as the Earth Observatory of Singapore, Nanyang Environment & Water Research Institute, Energy Research Institute at NTU, and Singapore Centre for Environmental Life Sciences Engineering.

The University aspires to shape an AI-enabled future. By bringing together global talent across disciplines and combining technology with human creativity, NTU nurtures AI-ready graduates, drives breakthrough discoveries, and forges partnerships that tackle the challenges of our time.

For more information, visit www.ntu.edu.sg

About the National Space Agency of Singapore

The National Space Agency of Singapore (NSAS) was established on 1 April 2026, and operates under the Ministry of Energy, Trade and Industry to advance Singapore's national space ambitions and be a credible contributor to the global space ecosystem. NSAS carries out five core functions: (i) developing and operating Singapore's national space capabilities, (ii) advancing space technologies through research and development, (iii) growing a vibrant space industry in Singapore, (iv) forging international partnerships with like-minded nations, and (v) shaping national space legislation that promotes space safety and sustainability while supporting business growth.

For more information, visit www.space.gov.sg