UC SANTA BARBARA
THE Current

September 24, 2025
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Chemist Grace Han named Moore Inventor Fellow

UC Santa Barbara Associate Professor of Chemistry and Biochemistry Grace Han has been named one of five scientist-inventors nationwide to receive a 2025 Moore Inventor Fellowship from the Gordon and Betty Moore Foundation. Han's research centers on molecular solar thermal energy storage, developing fuels that can capture sunlight, store it in chemical bonds, and later release it as heat on demand. The approach offers a clean, emission-free alternative to fossil fuels for residential and industrial heating, the possibility of off-grid thermal power, and a pathway to new sustainable energy technologies.

"My goal is to design molecules that act like rechargeable batteries for sunlight," Han said. "By storing solar energy in chemical bonds and releasing it later as heat, we can provide a clean, reliable source of power even when the sun isn't shining."

In announcing the award, the foundation described Han's work as "innovative fuels that catch sunlight and store it like a battery, providing a clean way to stay warm, even when the sun isn't out." Her project aims to deliver a compact and scalable storage platform that integrates energy capture, storage and delivery within single organic molecules.

Han joined UCSB's Department of Chemistry and Biochemistry in 2025. She earned her Ph.D. in chemistry at MIT under the mentorship of Professor Timothy Swager, developing organic chromophores for photovoltaic applications, and continued her

training as a postdoctoral researcher in materials science and engineering at MIT with Professor Jeffrey Grossman, investigating the design and optical properties of organic and nanomaterials. She began her independent career at Brandeis University in 2018, where she was promoted to associate professor with tenure in 2024. Her group combines synthetic chemistry with photophysical and materials characterization to develop systems for photon energy capture, storage and release, with extensions into optically controlled recycling of materials and light-driven phase transitions.

Her contributions have earned recognition including the Cram Lehn Pedersen Prize, the ChemComm Emerging Investigator Lectureship, the Dreyfus Teacher-Scholar Award, the Sloan Research Fellowship, the National Science Foundation CAREER Award, the Air Force Office of Scientific Research Young Investigator Program Award, and the American Association for the Advancement of Science's Marion Milligan Mason Award.

"The Moore Inventor Fellows program is unique in that it goes beyond traditional research funding," Han said. "It provides resources for prototyping, building partnerships with engineers, and even gaining entrepreneurial experience — all of which are essential for translating scientific discoveries into real technologies that benefit society."

This year's Moore Inventor Fellows were chosen from nearly 250 applicants. Alongside Han, the 2025 cohort includes Omar Abudayyeh of Harvard Medical School, who is developing RNA-based technologies to treat neurological diseases; Scott Cushing of Caltech, whose on-chip photonics with entangled photons could enable real-time disease diagnosis; Qiong Ma of Boston College, whose twistronic artificial synapses connect discoveries in advanced materials with neuroscience-inspired computing; and Daniel Wangpraseurt of Scripps Institution of Oceanography, whose biomimetic gels accelerate coral reef recovery. Together, their inventions reflect the fellowship's mission to support bold ideas that can reshape science and society.

"Over the past 10 years, this fellowship has recognized the ingenuity and creativity needed to meet today's challenges and create a better future," said Harvey V. Fineberg, president of the Gordon and Betty Moore Foundation. "These early-career visionaries are poised to develop tools and inventions that can make a positive

difference.”

With the conclusion of this year’s competition, the foundation has fulfilled its decade-long pledge to nurture 50 inventors to shape the next 50 years. Han joins this distinguished group as she advances her work on solar-rechargeable fuels and materials that may one day help heat homes, power industry and support a sustainable energy future.

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Awards
Energy Efficiency

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