

HU-ACE NEWS LETTER

Advanced Core for Energetics, Hiroshima University

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Activities of the Core

- Nov. 6, 2025 Special Lecture on Carbon Recycling (NEDO Project) – 8th Session: Advances in Chemical Product Synthesis Technologies (co-organized by HU-ACE)
- Nov. 15, 2025 Higashihiroshima Energy & Eco Seminar – 6th Session: “Hydrogen – A Clean Fuel That Produces No Carbon Dioxide” (co-organized by HU-ACE)
- Nov. 18, 2025 The 13th Asian Conference on Biomass Science (ACBS2025) (in Hirosaki) (co-organized by HU-ACE)
- Nov. 27, 2025 The 5th Energy Storage Seminar. (co-organized by HU-ACE)
- Nov. 28, 2025 Special Lecture on Carbon Recycling (NEDO Project) – 9th Session: Advances in Carbon Recycling Technologies [Basic Course] (co-organized by HU-ACE)
- Nov. 28, 2025 The 109th HU-ACE Steering Committee Meeting

HU-ACE Seminar Series on Energy Storage

The “Energy Storage Seminar,” organized by HU-ACE and co-hosted by the Division of Energy of the Society of Chemical Engineers, Japan, began in July 2024. This seminar series aims to explore the forefront of energy storage—a key technology for realizing a decarbonized society—by sharing the latest research findings, technological trends, and fostering active discussions. It is an online seminar open to all, including researchers, engineers, policymakers, and anyone interested in the energy field. Participation is free of charge. So far, four sessions have been held, each attracting many participants. The fifth seminar is scheduled for Thursday, November 27, featuring Professor Yutaka Tabe from Hokkaido University. He will give a lecture titled “The Role of Electric Power Storage and Performance Evaluation of Redox Flow Batteries for Future Energy Systems.” We warmly invite you to join us and take this opportunity to learn about the latest advances in energy storage research.

Web site (in Japanese): www.hiroshima-u.ac.jp/news/93634

Record of Energy Storage Seminars (1st – Latest)

No.	Date	Lecturer	Affiliation	Presentation Title
1	2024/7/22	Prof. Yukitaka Kato	Tokyo Institute of Technology	Energy Storage for Green Transformation
2	2024/10/25	Prof. Mikio Kumita	Kanazawa University	Development of Thermal Storage Materials for Adsorption-Based Heat Storage and Refrigeration Cycles
3	2025/1/14	Prof. Hiroshi Suzuki	Kobe University	Realizing a Carbon-Neutral Society Using Hard-Shelled Microencapsulated Thermal Storage Materials
4	2025/7/17	Dr. Fang HE	Hokkaido University	Practical Research on Adsorption Heat Pumps for a Low-Carbon Society
5	2025/11/27	Prof. Yutaka Tabe	Hokkaido University	Role of Electricity Storage in Future Energy Systems and Performance Evaluation of Redox Flow Batteries

Related Events

- Thu, Nov. 27, 2025 16:30–18:00 5th Energy Storage Seminar (Co-organizer)
- Thu, Dec. 4, 2025 16:20–17:50 124th Biomass Evening Seminar (Co-organizer)
- Contact us for more information: hu-ace-info@ml.hiroshima-u.ac.jp



Research consultation and joint research are welcome.

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Do You Know Energy?

Laser Fusion

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Professor, Graduate School of Advanced Science and Engineering

Research fields:

Plasma science, Nuclear fusion studies, Computational science

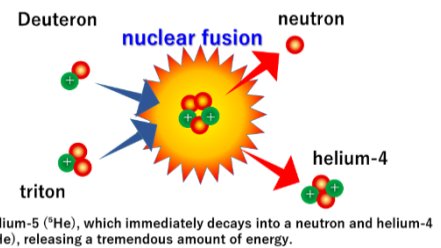
Keywords:

Laser Plasma Physics, Numerical Simulation, Laser Fusion
High Energy Density Physics



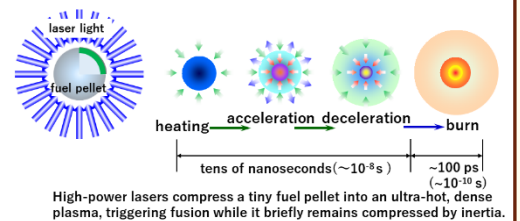
What is Laser Fusion?

Laser fusion is a technology in which powerful laser beams irradiate a small fuel pellet to create extremely high-temperature and high-density plasma, allowing atomic nuclei to fuse within a very short time and release a large amount of energy. The fuel consists mainly of naturally abundant deuterium (D) and tritium (T), the latter of which can be produced from lithium through nuclear transmutation. For example, when just 1 gram of DT fuel is fully burned, it yields energy equivalent to burning about 13 tons of coal or 7.5 tons of oil. Because it generates no CO₂ or almost no long-lived radioactive waste, it is expected to become a promising next-generation carbon-free energy source.



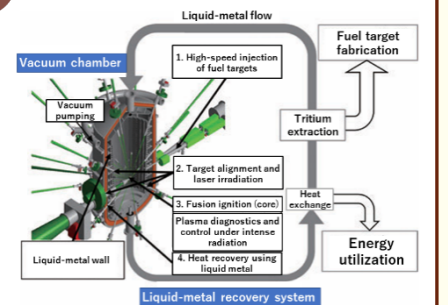
How does Laser Fusion work?

When high-power lasers irradiate a fuel pellet just a few millimeters in diameter, it is rapidly compressed. For a brief moment, inertia sustains the ultra-high-density state, allowing D and T nuclei to fuse. Fusion requires an ultra-high-temperature plasma (~100 million °C) to overcome the Coulomb repulsion. Laser implosion creates this extreme state, releasing a large amount of energy in a very short time. Future fusion reactors will need continuous pellet injection at ~200 m/s, with precise laser irradiation to sustain fusion reactions.



Why is Laser Fusion important?

In nuclear fusion, surpassing the *scientific break-even*—where the fusion energy output equals the energy input—was achieved for the first time in 2022 using the laser fusion scheme at the U.S. National Ignition Facility (NIF), greatly raising expectations for practical applications. To realize a stable power supply with a *fusion reactor*, it is necessary to exceed the *engineering break-even*—the point where the output energy equals the total energy required to operate the reactor. Although many challenges remain—such as fuel production and extraction, high-efficiency energy conversion, and the development of advanced structural materials—laser fusion is being actively researched and developed worldwide as a clean, high-efficiency next-generation energy source.



How will Laser Fusion be used in the future?

Laser fusion provides high flexibility in controlling the fuel-target structure and laser-irradiation conditions. This enables the reproduction of ultra-high-pressure environments similar to planetary and stellar interiors, allowing applications in planetary and stellar materials research and new-material creation. It can also be extended to laser-driven particle-acceleration technologies for medical and analytical use. Laser fusion is also drawing attention for other potential uses, such as hydrogen production using high-temperature plasma and advanced space-propulsion systems. Beyond being a *future energy source*, it can serve as a flexible experimental platform that creates extreme states of matter, opening new possibilities for science and technology.