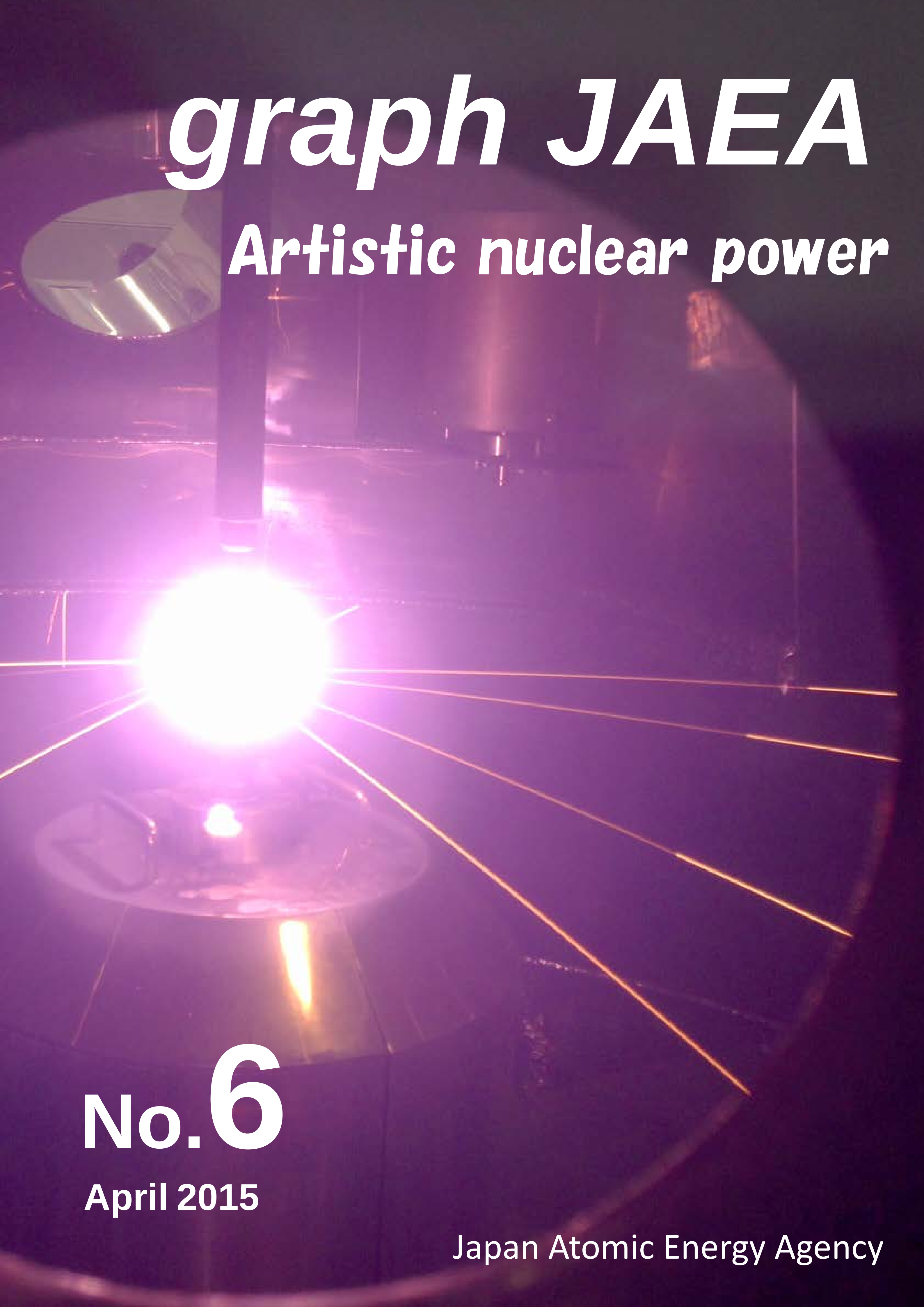


# graph JAEA

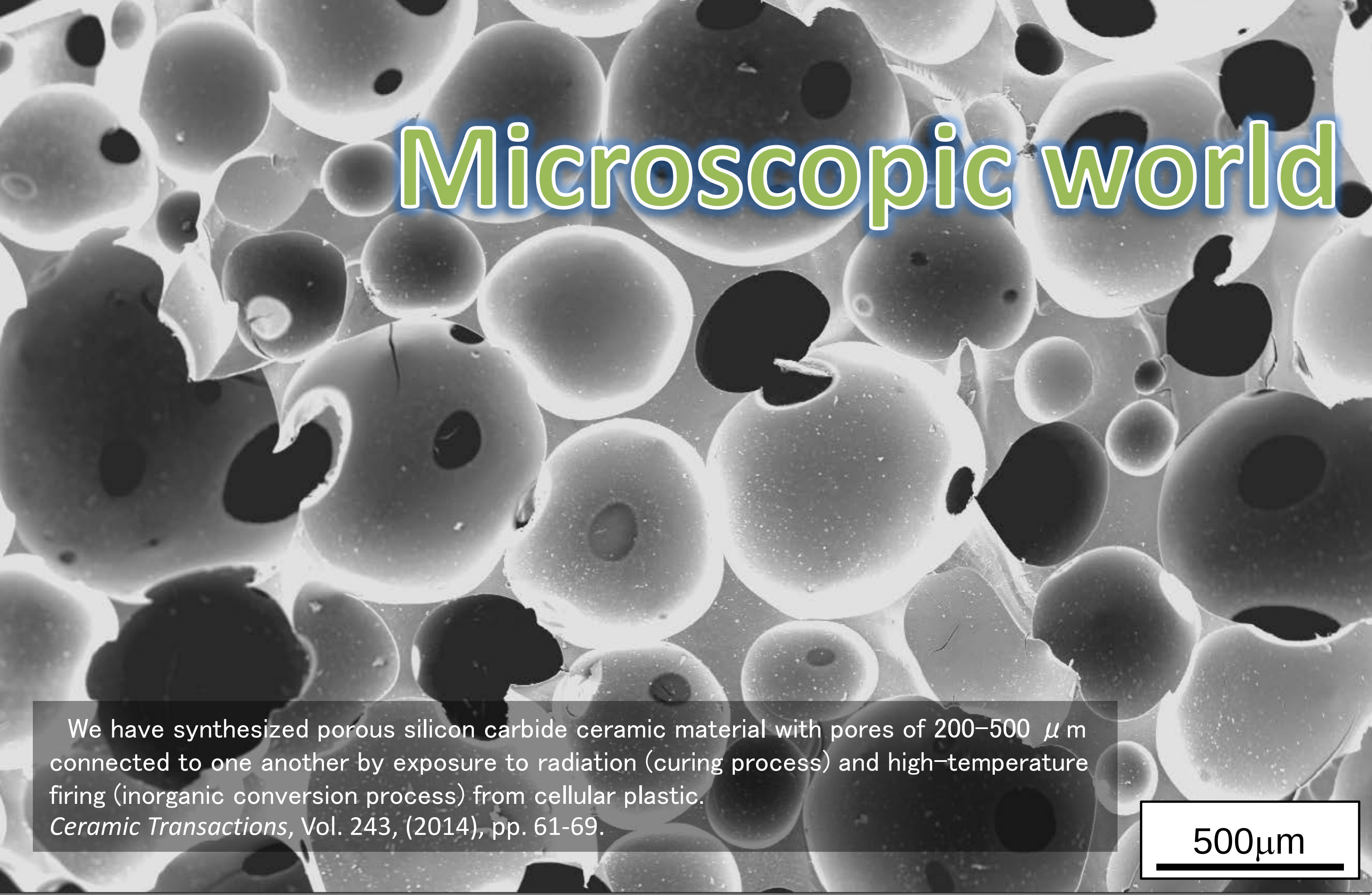
## Artistic nuclear power

No.6

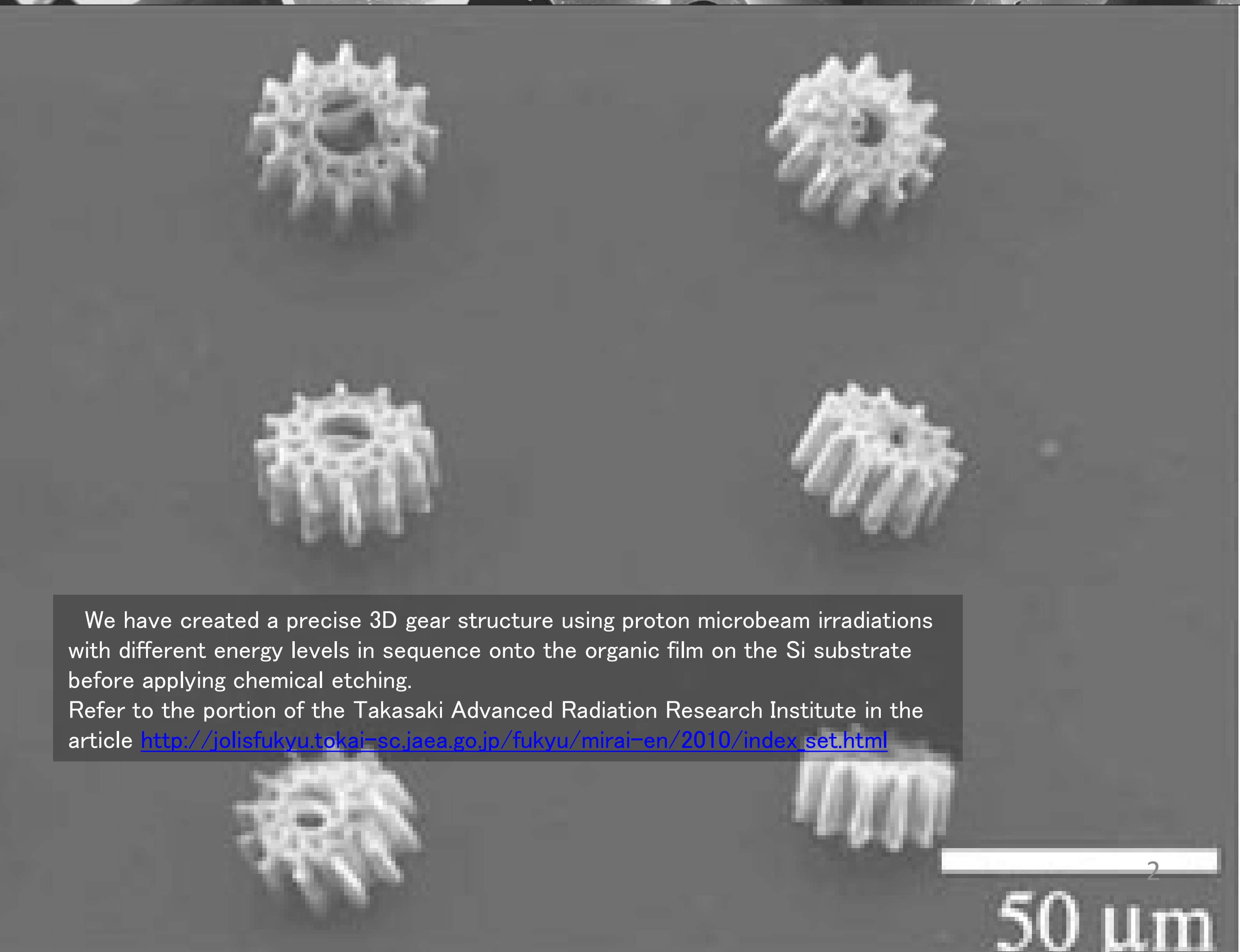
April 2015

Japan Atomic Energy Agency

# Microscopic world

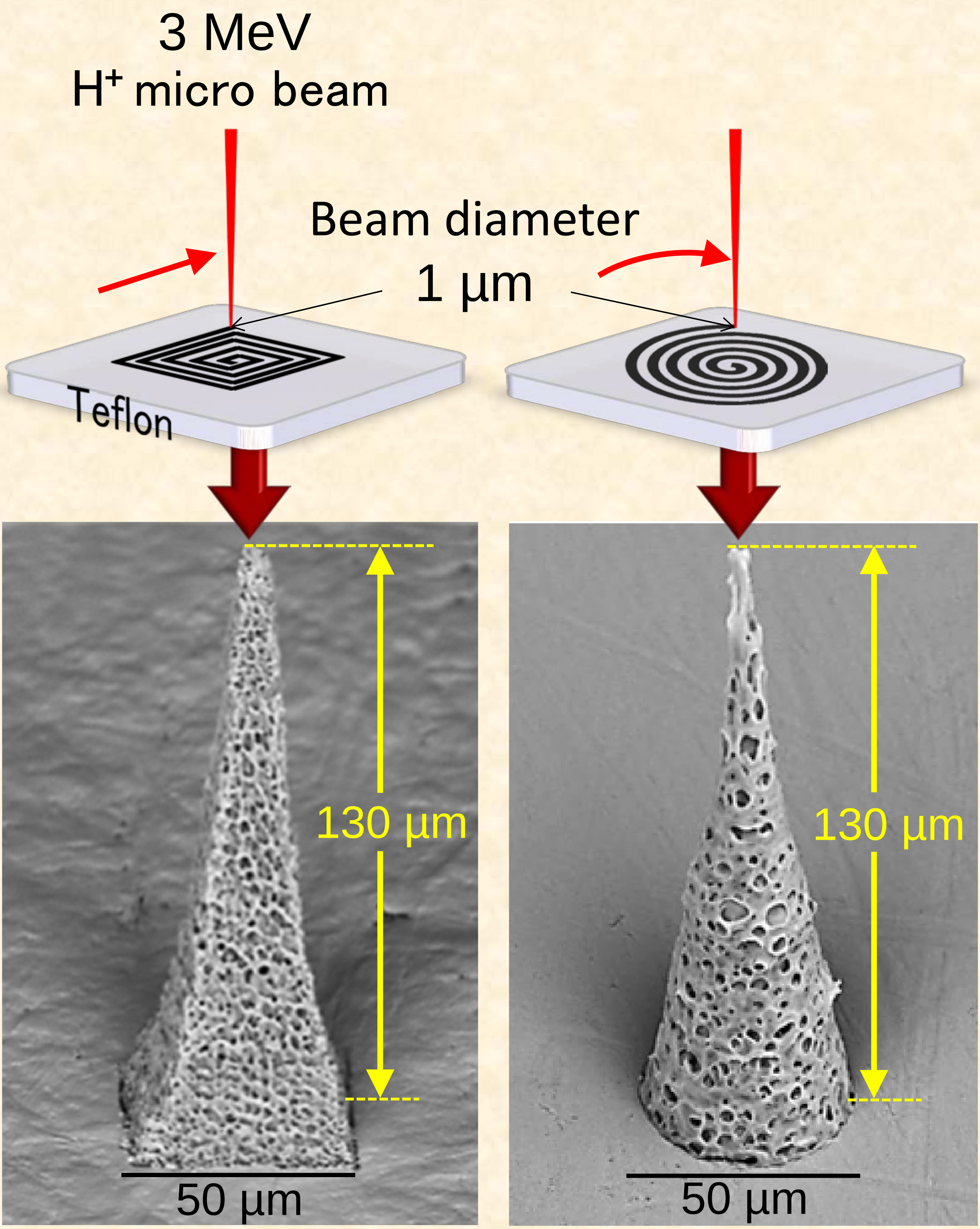



We have synthesized porous silicon carbide ceramic material with pores of 200–500 μm connected to one another by exposure to radiation (curing process) and high-temperature firing (inorganic conversion process) from cellular plastic.
*Ceramic Transactions*, Vol. 243, (2014), pp. 61-69.




We have created a precise 3D gear structure using proton microbeam irradiations with different energy levels in sequence onto the organic film on the Si substrate before applying chemical etching.
Refer to the portion of the Takasaki Advanced Radiation Research Institute in the article http://jolisfukyu.tokai-sc.jaea.go.jp/fukyu/mirai-en/2010/index_set.html

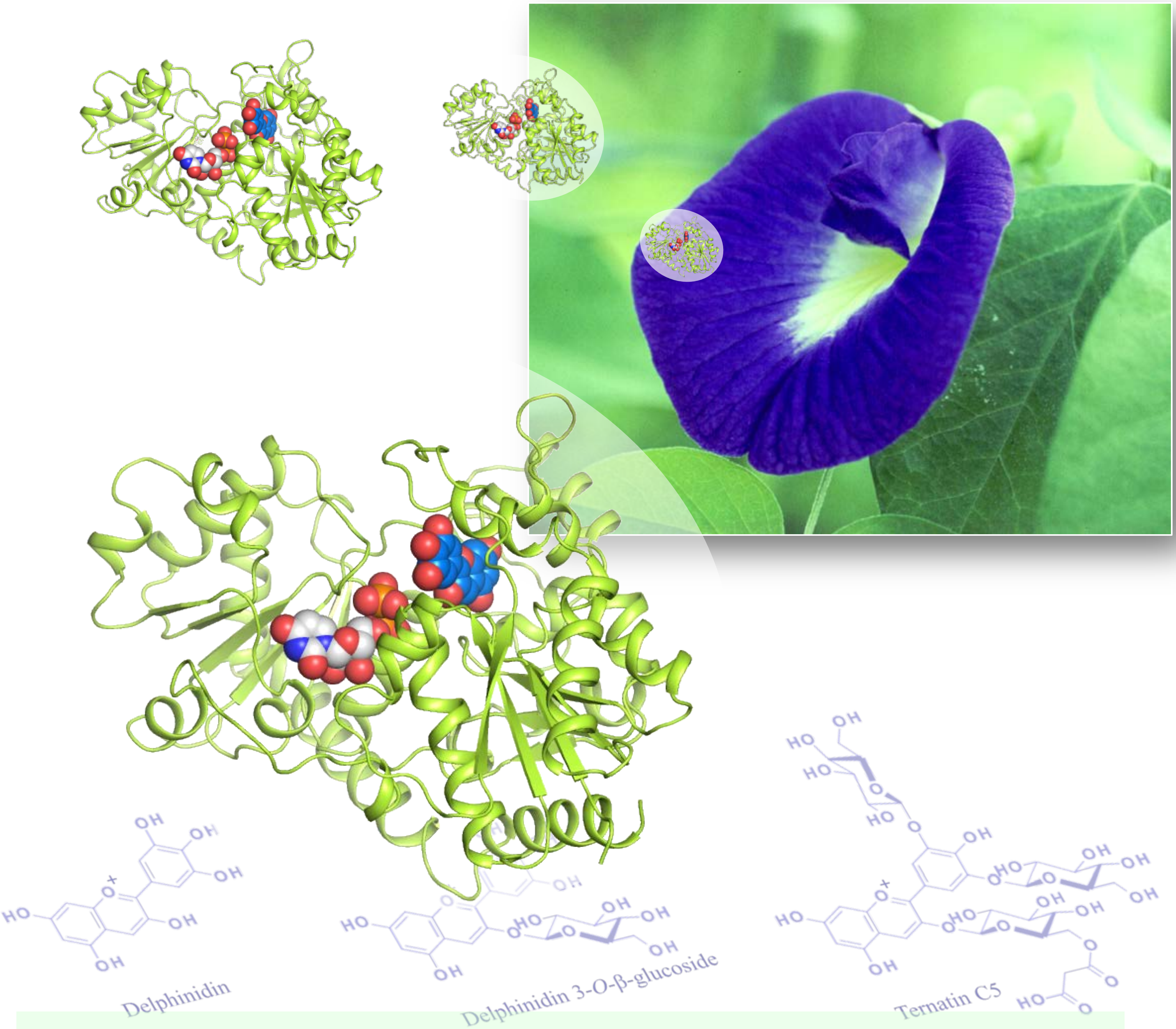
# Microscopic world




Extremely thin rays of particles moving at 30,000 km/sec are irradiated to the Teflon plate from the center to the peripheral in spiral. Then, the irradiated parts rise forming a shape like soft-serve ice cream, which become a cone or pyramid as depicted above
http://jolisfukyu.tokai-sc.jaea.go.jp/fukyu/mirai-en/2013/img/honbun/13-19.jpg

# We have created brilliant-tone carnations


Anthocyanin pigments in the cells of common carnation petals bond with malic acid. We have succeeded in creating carnations with anthocyanin pigments that do not bond with malic acid due to mutation caused by ion–beam irradiation. In the petals of these carnations, pigments are agglomerated in the cells, which changes reflection of light and creates a sparkling tone.




# We have revealed the three-dimensional structure of an enzyme producing flower pigments

JAEA and National Agriculture and Food Research Organization (NARO) jointly succeeded in determining the three-dimensional structure of an enzyme "*Ct*3GT-A" which produces anthocyanin pigments contained in flowers and fruits. The figure in the center illustrates how the pigment material is bound to the enzyme included in the petals of *Clitoria ternatea* (top right, source: NARO).
https://www.jaea.go.jp/english/news/press/p2015022601/

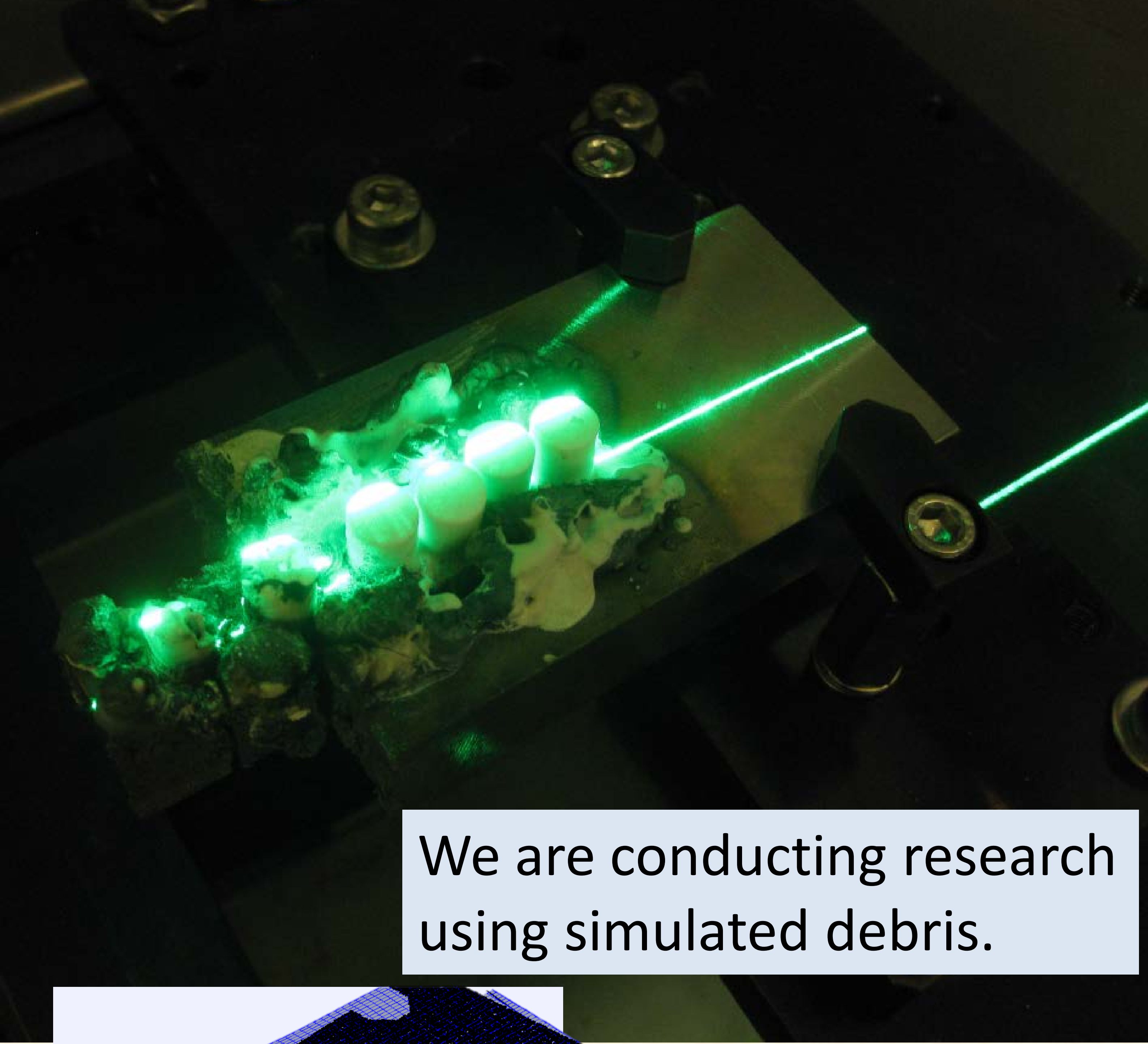
# Inside the tandem accelerator (5MV) tank of the accelerator mass spectrometer at the JAEA-AMS-TONO

Picture of “accelerator”, the heart of the accelerator mass spectrometer which can determine age of hundreds to millions of years. Ions are accelerated to the speed of traveling half way around the earth per second as they pass the accelerator tube placed at the center of the corona rings aligned in neat rows. As the ions travel at this high speed, they can be separated from the impurity ions and the age can be determined based on the number of those ions.

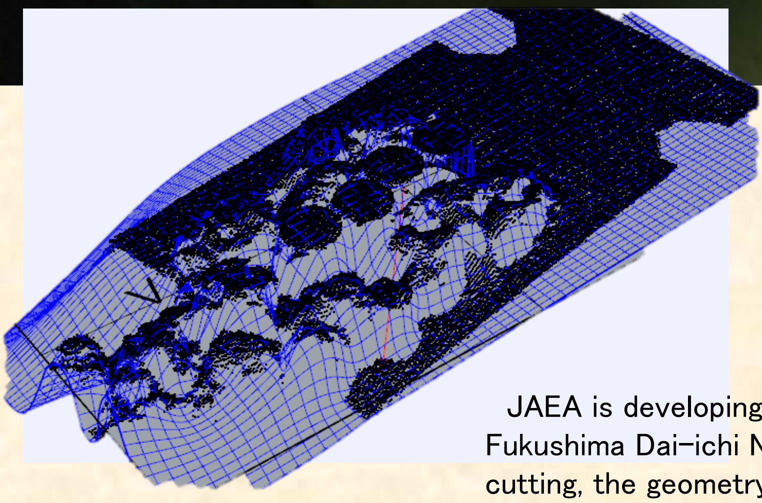
http://www.jaea.go.jp/04/tono/tgc_e/index_e.html



Accelerator mass spectrometer at the JAEA-AMS-TONO



# We are conducting research using simulated debris.

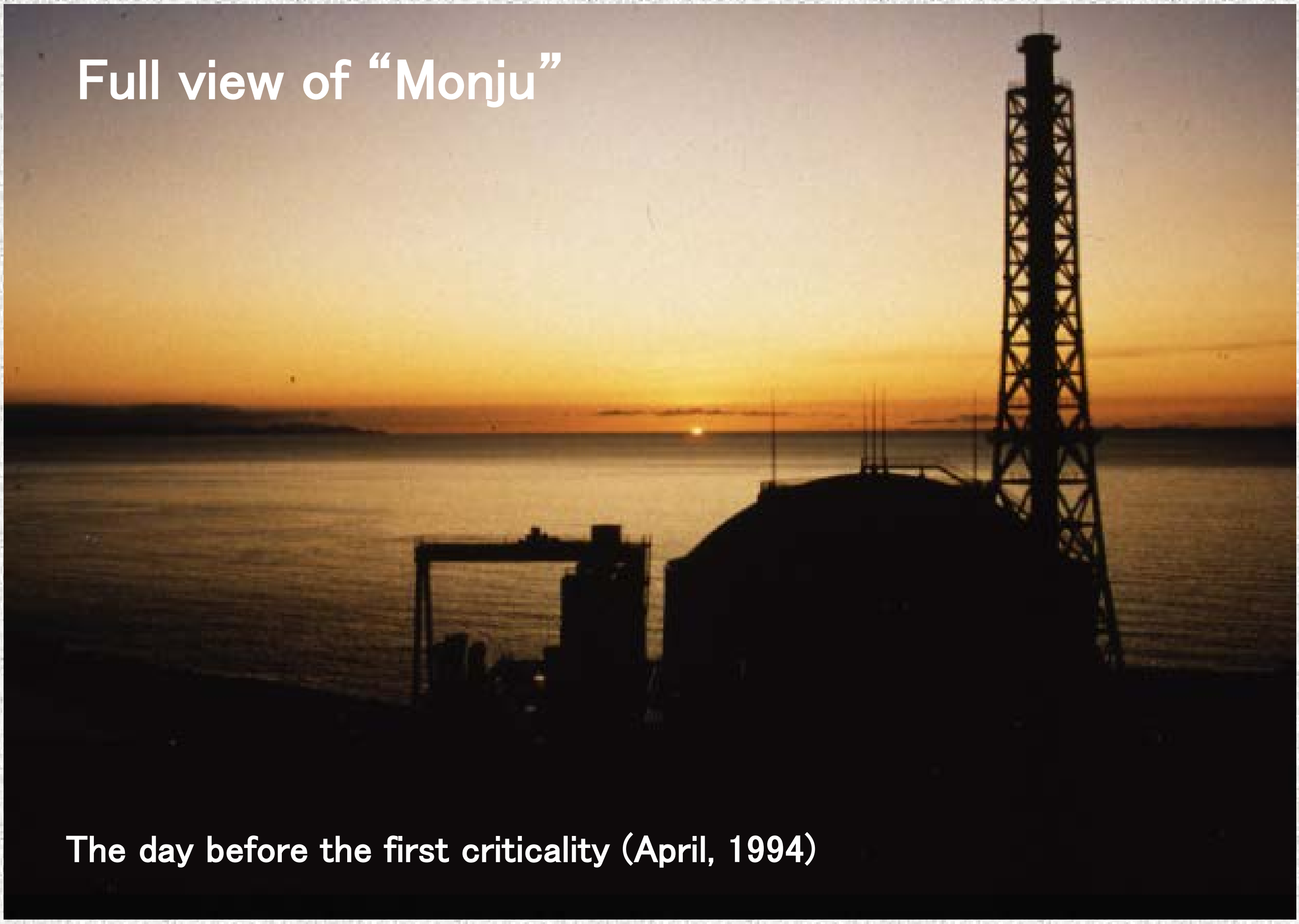


JAEA is developing technology of cutting fuel debris present in Fukushima Dai-ichi Nuclear Power Plant using high-powered laser. Before cutting, the geometry of fuel debris must be exactly determined.
The above picture indicates measurement of 3D geometry of a test piece which simulates fuel debris using the laser scanner. The bright green part is where the test piece is exposed to the low-powered laser beam.

The figure on the bottom left is the 3D data of the surface obtained by the scanner.

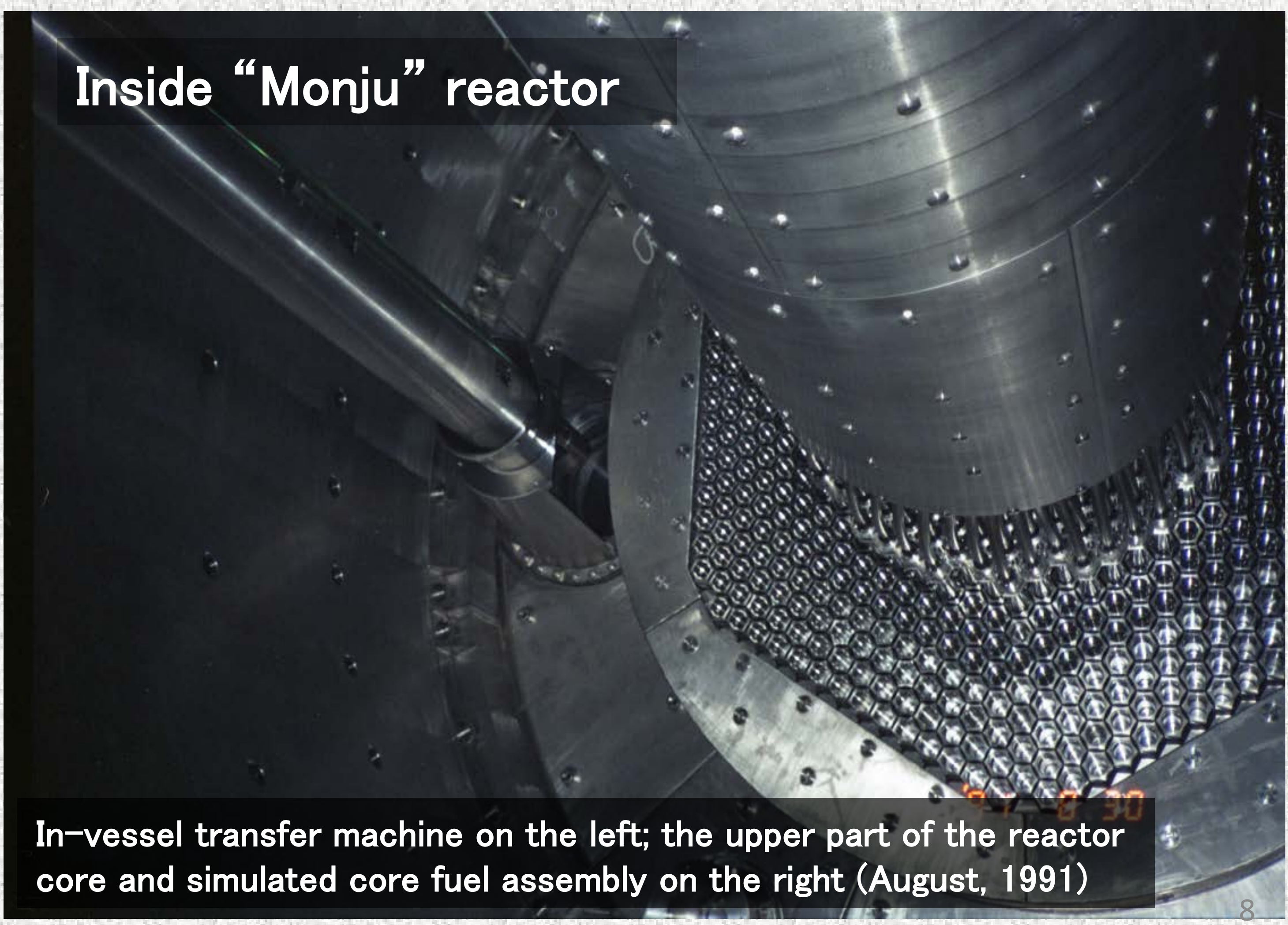
http://www.jaea.go.jp/english/publication/graph_JAEA/graph_JAEA_03.pdf
(p.11, loading may take time)

## Full view of “Monju”

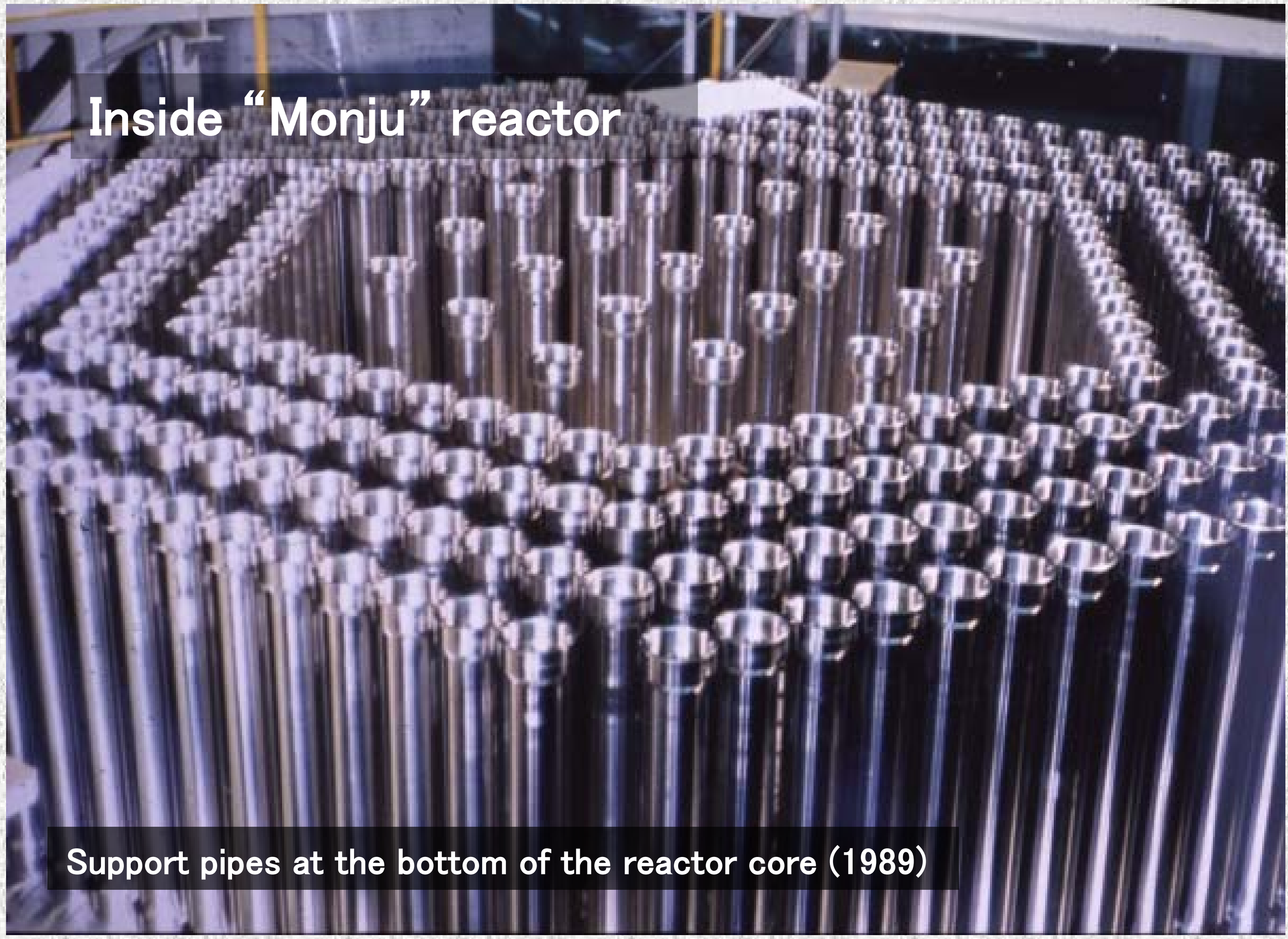


The day before the first criticality (April, 1994)

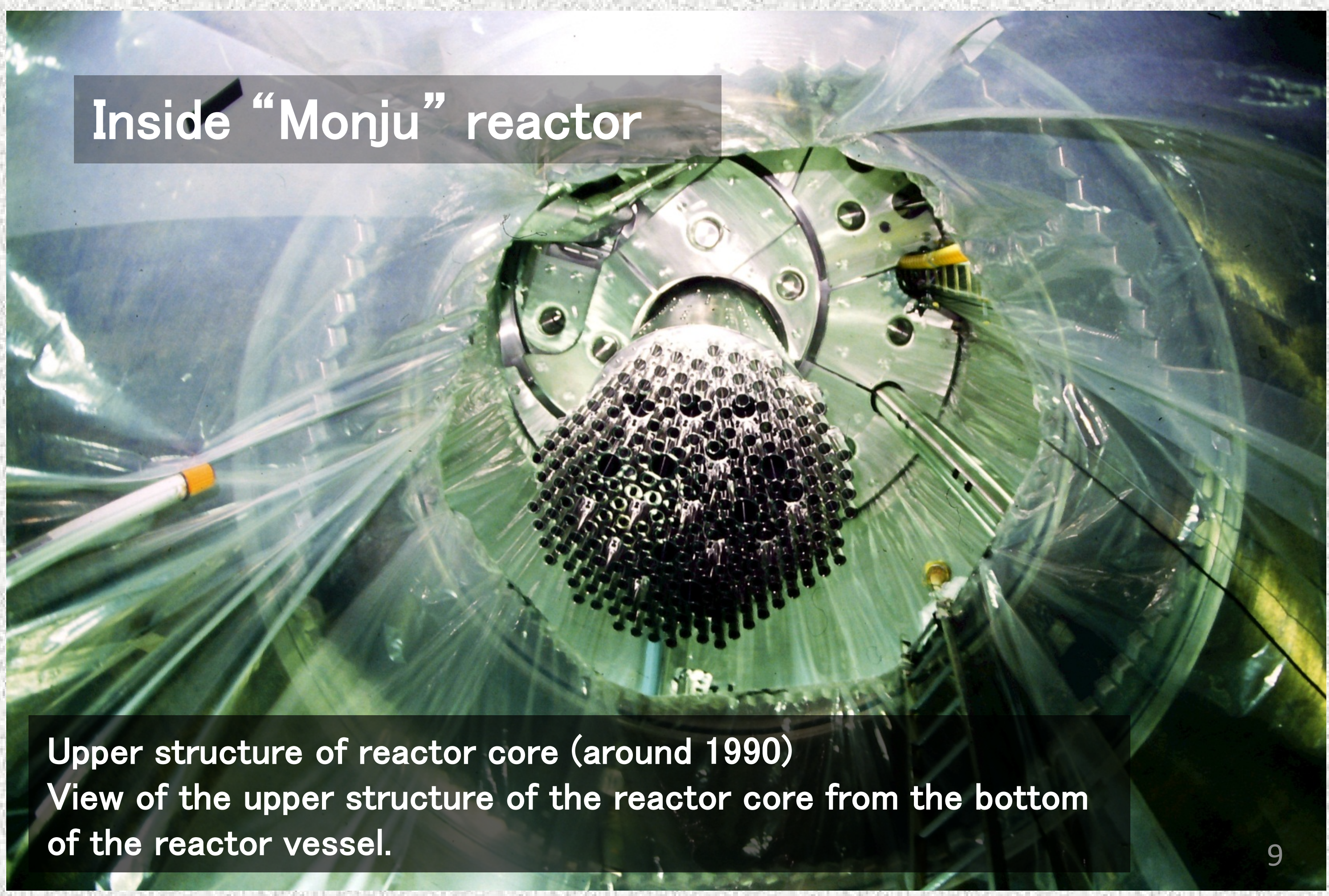
## Inside “Monju” reactor



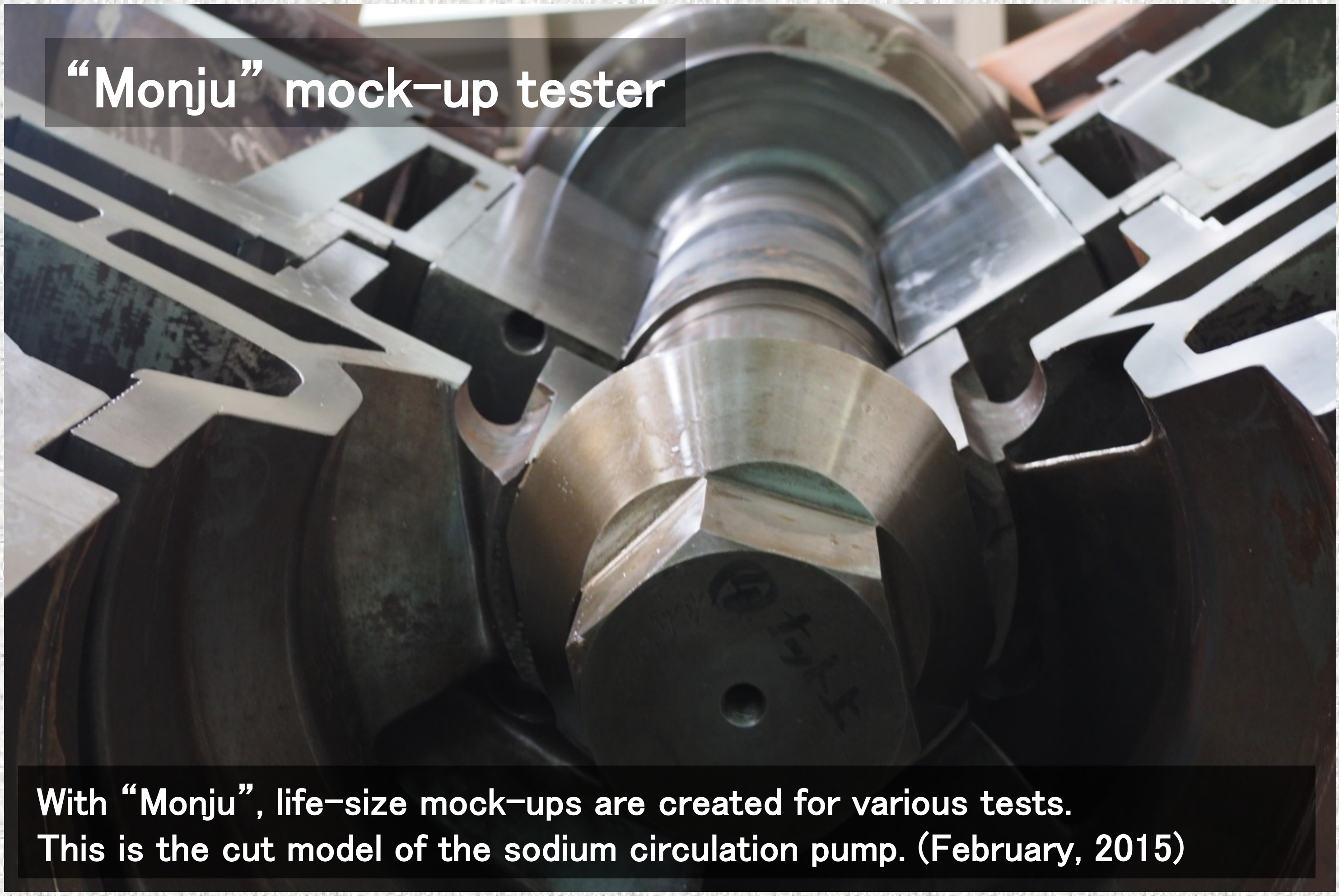
In-vessel transfer machine on the left; the upper part of the reactor core and simulated core fuel assembly on the right (August, 1991)



Support pipes at the bottom of the reactor core (1989)

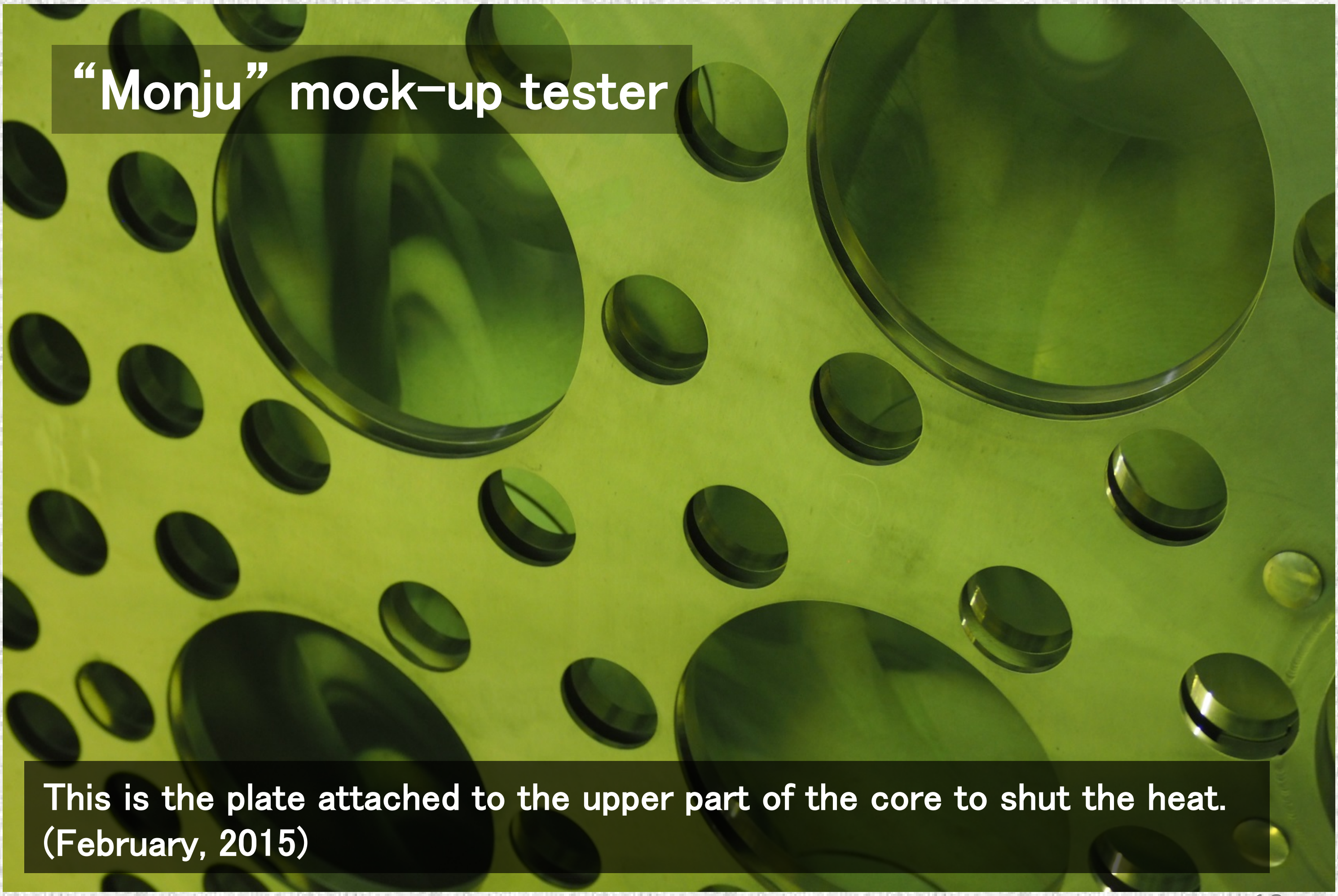


Upper structure of reactor core (around 1990)
View of the upper structure of the reactor core from the bottom of the reactor vessel.



"Monju" mock-up tester

With "Monju", life-size mock-ups are created for various tests.
This is the cut model of the sodium circulation pump. (February, 2015)



"Monju" mock-up tester

This is the plate attached to the upper part of the core to shut the heat.
(February, 2015)

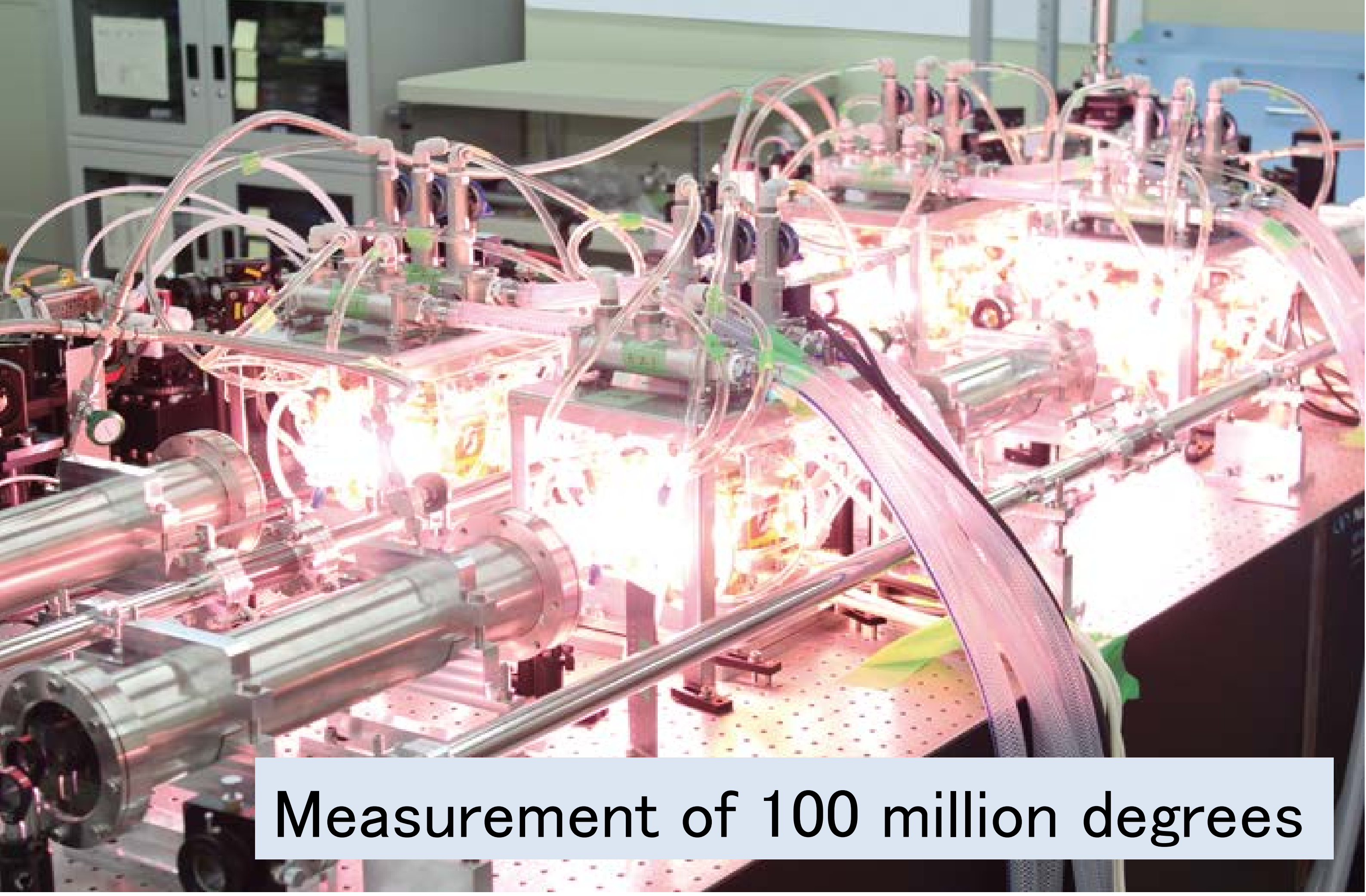
# Entrance to the underground world

The high-level radioactive waste generated in the process from nuclear power generation is required to be disposed in a deep underground at the depth of below 300 m by law.

At Mizunami Underground Research Laboratory(MIU), in order to enhance the reliability of technologies and methods used to investigate the deep underground conditions, we are conducting research on the characteristic and strength of rock bed, and the ground water flow and quality by actually excavating vertical shafts and horizontal tunnels,

The picture is a view looking down the shaft bottom from the mouth of the Main shaft at the MIU.

http://www.jaea.go.jp/04/tono/tgc_e/index_e.html



# Measurement of 100 million degrees

(Above) In order to produce nuclear fusion energy, which is called “Sun on Earth”, plasma of ultra-high temperature exceeding 100 million degrees is required. A special laser thermometer as depicted above must be used to measure the temperature as high as 100 million degrees.

(Photo on the cover) Inside the fusion reactor, small pebbles of beryllium intermetallic compounds are used to produce tritium to be used as the fuel.
To create these small pebbles, the tip of the rotating rod of beryllium intermetallic compounds is melted, and by centrifugal ejection small round spheres are produced.
This process just looks like a sparkler (slow-burn firework with sparks).

## No6 contents




***graph JAEA***

**April 2015,No. 6**

**Public Relations Section, Japan Atomic Energy Agency**

Funaishikawa 765-1, Tokaimura
Naka County, Ibaraki Prefecture
Postal code: 319-1184
Telephone: 029-282-0749