



Illuminating the moment.
Light sustains Innovation.



International Center for
Synchrotron Radiation Innovation Smart
Tohoku University

NanoTerasu: Peering at the Frontiers of Science with State-of-the-Art Light

International Center for
Synchrotron Radiation Innovation Smart (SRIS)
Tohoku University

Director

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Tohoku University operates under the spirit of Research First, and a policy of Practice Oriented Research and Education; it is the goal of the International Center for Synchrotron Radiation Innovation Smart (SRIS) to uncover new knowledge for humankind, and it will seek to do this through NanoTerasu.

NanoTerasu is a next-generation 3GeV synchrotron radiation facility—a giant microscope roughly the size of Tokyo Dome—located on the university's Aobayama New Campus. Generating light that is more than one billion times brighter than sunlight, the facility is capable of making nanoscale observations of both the surfaces and interiors of different objects; utilizing various observation methods, it is also capable of visualizing the microscopic mechanisms by which these objects function.

Scientific technologies hold the key to the progress of modern civilization, and scientific frontiers must be crossed if humankind is to resolve the varying issues it faces. Science itself makes progress through discoveries rooted in curiosity. By applying our existing knowledge to this process of discovery, we gain further insights; and these insights bring about progress for modern civilization—in industry and in medicine—and open up new possibilities for humankind.

SRIS boasts an array of specialists with the ability to make sophisticated use of NanoTerasu's world-leading light source—to collaborate on resolving issues, to develop cutting-edge methods of observation, and to open up new frontiers of science.

The center is set to play a key role for academia, industry, and the local community; it will provide powerful support for academic developments whose impacts will be felt around the world, and will encourage the development of globally minded talent.

SRIS: exploring the frontiers of science using high-brilliance synchrotron radiation



International Center for Synchrotron Radiation Innovation Smart (SRIS) is a new organization launched at Tohoku University in October 2019. We lead the creation of innovation by expanding the use of the next-generation synchrotron radiation facility to diverse fields of academia and industries. In addition, as an academic member, we support the concrete utilization of the new synchrotron radiation facility through the design of its endstations and

feasibility studies at existing synchrotron radiation facilities. We also collaborate with the Photon Science Innovation Center (PhoSIC) and the National Institutes for Quantum Science and Technology. We will continue to act as a hub connecting universities and research institutes in Japan and abroad, creating an environment that develops the abundant talent and individuality of the next generation.

“Coalition” : a new concept of cooperation between academia and industries

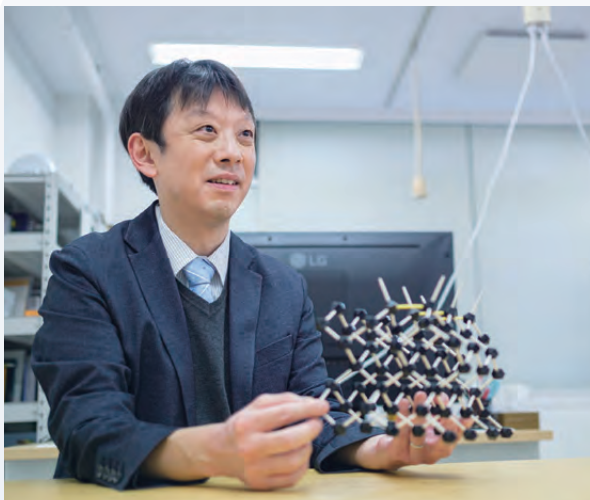
The “Coalition” is a new concept for utilizing the next-generation synchrotron radiation facility. For industry members, it is “a framework for accelerating research and development with a shared exit vision through one-on-one partnerships with academic partners who have the necessary expertise and measurement technologies.” For members of academia, it is “a framework that provides opportunities to discover new themes related to scientific research and the development of advanced measurement systems latent in the challenges faced by the industry.” Companies, research institutes, and universities that have agreed to the “Coalition concept” have already contributed funds for the construction of the facility and are participating in the project as “Coalition members.” Under this concept, they have already started feasibility studies.

An international network hub with synchrotron radiation at its core

With academic co-creation through international collaboration as one of its goals, SRIS has launched the world's first and largest "Quadrilateral Research Complex," an all-in-one base for propelling innovation, in cooperation with world-class universities and research institutions in four regions: Europe, the United States of America, Asia/Oceania, and South America. Through the complementary utilization and application of the next-generation synchrotron radiation facility, its neighboring resources, and other facilities in Japan and abroad, we will engender international academic exchange.



Research and development accelerated by co-creation with strategic academic partners



To meet the diverse needs of companies including what they want to “observe and solve,” SRIS and PhoSIC will collaborate at the next-generation synchrotron radiation facility to establish a system, wherein academic members who are maximizing “cutting-edge scientific light” will support member companies from industry.

Such member companies from industry can utilize measurement data for everything from product development to strategic planning. Measurement outcomes can be proprietary

and are kept confidential. Some industry members that have already started feasibility studies are strengthening relationships with academic members and are generating guidelines for product development strategies.

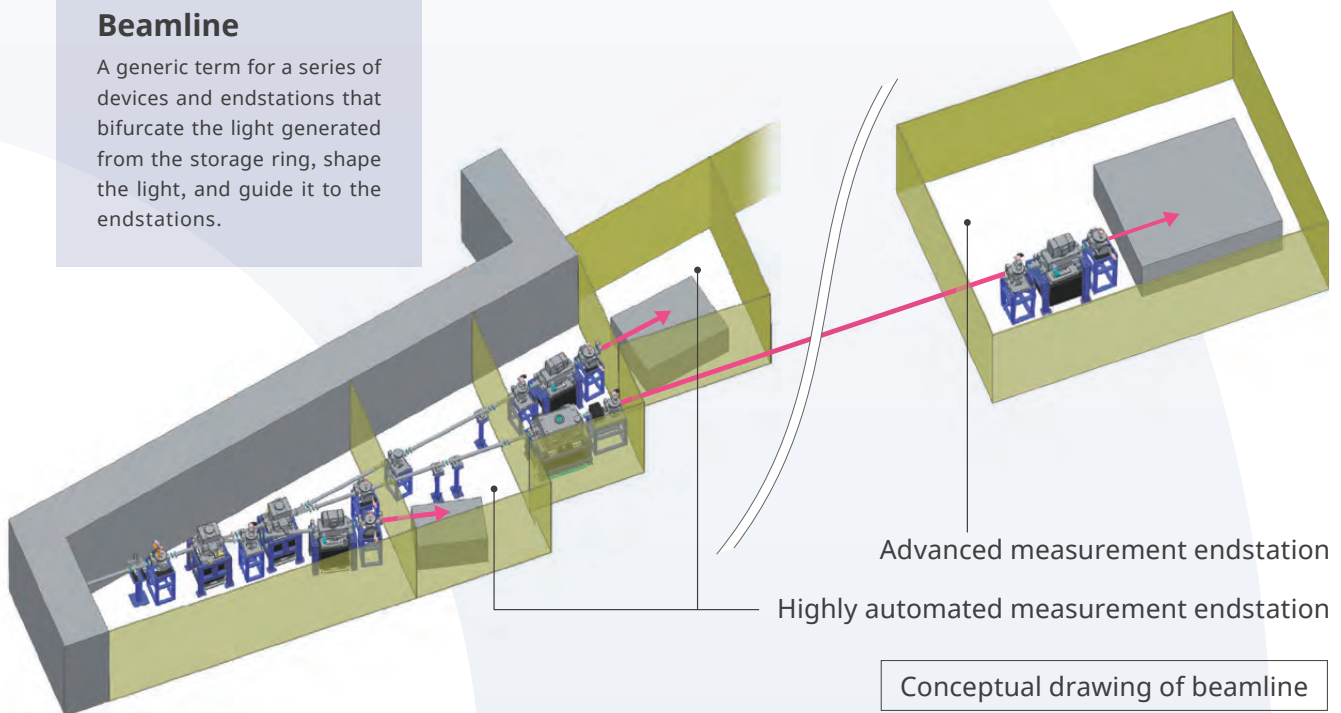
Seven coalition beamlines to meet diverse measurement and analysis needs

With an extensive lineup of measurement methods, synchrotron radiation facilities meet the need for observation and verification which are the fundamentals of science. Compared to existing synchrotron radiation facilities for soft X-rays in Japan, the next-generation synchrotron radiation facility is designed to achieve much higher brilliance. This excellent light-source performance enables the observation of an object's configuration and state of reaction on a nanoscale.

The first ten beamlines are to be installed at the next-generation synchrotron radiation facility. Seven of them are coalition beamlines, and coalition members have priority access to them. There are two types of laboratories called endstations. The first type is for “highly automated measurements” where routine measurements are conducted efficiently and flexibly. The second one is for “advanced measurements” that can be used to conduct measurements in the development process, such as operando spectroscopic analysis and multidimensional coherent imaging, and install innovation benches for challenging measurements. Coalition members can participate in discussions about the coalition beamlines, and their operating systems from the design phase.

Beamline

A generic term for a series of devices and endstations that bifurcate the light generated from the storage ring, shape the light, and guide it to the endstations.



Organization



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