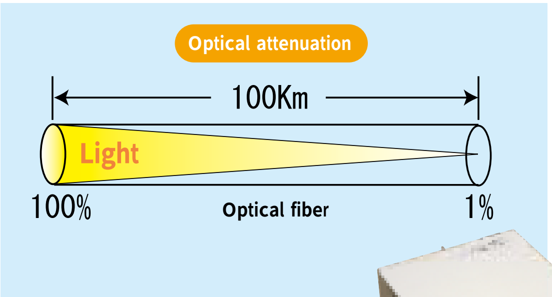
An UltraHigh-Speed Optical Network is the Key to the Future of Information Communication

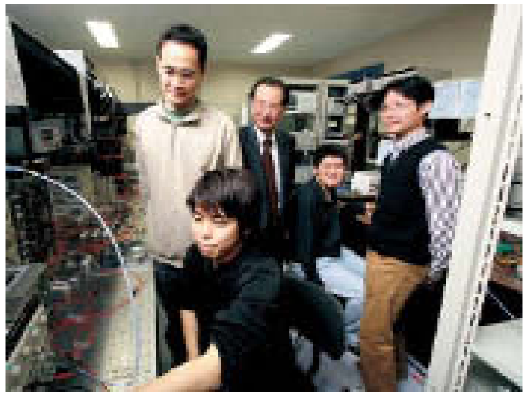
Professor Nakazawa's laboratory is well known for its research and development related to ultra-short optical pulse generation and transmission technologies, high-speed mode-locked lasers, and optical signal processing, which are the fundamental technologies for ultrahigh-speed optical communication. The laboratory aims to achieve a global ultrahigh-speed optical network for the 21st century.

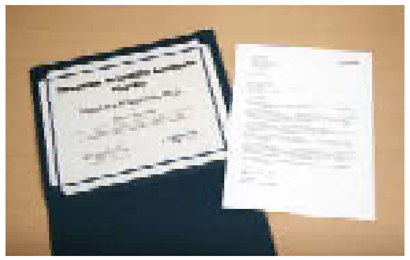
The Ministry of Education, Culture, Sports, Science and Technology adopted the idea of "Establishing a new transmission technique that employs optical Fourier transformation" as an area of specially promoted research in 2004. The goal is to reduce the cost and enhance the performance of an ultrahigh speed optical communication system.

Professor Nakazawa received the Wood Prize from the Optical Society of America in 2005, and has been honored with many other awards. In 2006, he was named as a Thomson Scientific Laureate, which indicates that he was considered a leading candidate for the 2006 Nobel Prize in Physics.



By pumping an erbium-doped optical fiber with a laser beam, light can travel over long distances without any attenuation. By combining this principle with an ultra-compact semiconductor laser, an innovative compact optical fiber amplifier, namely the EDFA, was realized.





His development of the erbium-doped fiber amplifier (EDFA) was the reason for Professor Nakazawa being selected as a leading candidate for the Nobel Prize in Physics.

【Ultrahigh-speed Optical Communication】

Professor **Masataka Nakazawa**

Born in 1952, he was awarded his Ph. D by the Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology. He then joined the Nippon Telegraph and Telephone Corporation (currently known as NTT). Since 2001, he has been a professor at the Research Institute of Electrical Communication, Tohoku University.

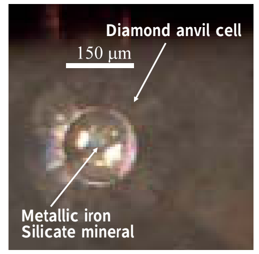
Professor Masataka Nakazawa, Research Institute of Electrical Communication http://www.nakazawa.riec.tohoku.ac.jp/

Honored with World-famed Academic Achievements

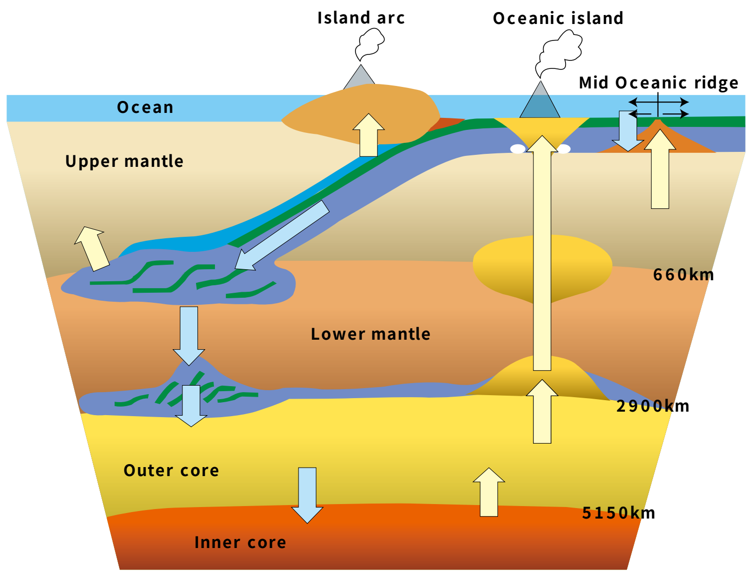
Elucidating the Mysteries of the Earth's Interior Under a Microscope

Professor Eiji Ohtani's Laboratory studies the internal structure of the Earth, and the structures and properties of the substances that compose our planet. In the laboratory they have generated a high-temperature and high-pressure environment similar to that of the Earth's interior, and they have conducted experiments to study how substances change in such an environment, in order to elucidate the billions of years of the evolutionary history of planet Earth.

The laboratory succeeded in measuring the density of hydrous magma at high temperatures and pressures. It has then proved that hydrous magma stays at the bottom of the upper mantle. It was known that water on the surface, on the ocean floor, is carried deep into the mantle due to its sinking plates, which in turn causes earthquakes and volcanic activity inside plates. This study was the first of its kind and highly praised by researchers in many countries around the world. His achievement and research result were published in the scientific journal Nature in 2005.



In a high-pressure diamond anvil cell, the reaction of the core with the mantle is reproduced.



The Earth's internal environment can be reproduced by using this high-pressure generation device, which is capable of applying ultra-high pressures and temperatures equivalent to those inside the core by heating up to the temperatures of several thousands degrees centigrade by focusing a laser beam.

【Earth and Planetary Material Physical Research】

Professor **Eiji Ohtani**

Born in 1950, he graduated from the Faculty of Science, Tohoku University, and finished his doctoral course in the Graduate School of Science, Nagoya University. He worked as a researcher in the Research School of Earth Sciences at The Australian National University, and then, became an associate professor in the Faculty of Science at Ehime University. In 1994, he assumed his current position as a professor in the Faculty of Science at Tohoku University.

Professor Eiji Ohtani, Graduate School of Science http://www.ganko.tohoku.ac.jp/bussei/