

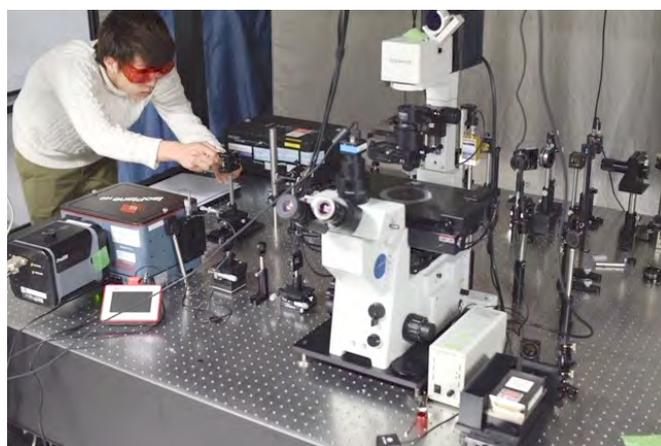
Institute of Post-LED Photonics (pLED), Tokushima University

Research in optical science has traditionally been the strength of Tokushima University, which has produced a Nobel laureate in Physics for developing the blue LED. To further reinforce this strength and promote optical science research for the creation of a new optical industry, the “Institute of Post-LED Photonics” was established as a university-affiliated institute in March 2019. Focusing on the wavelength regions of invisible next-generation light: “deep ultraviolet,” “infrared,” and “terahertz,” we have been working on the development of, and applied research in, practical next generation light sources as well as on the development of new medical methods through interdisciplinary research in medicine and optics.

Since its establishment, the Institute has hosted visits from more than 20 domestic and foreign research institutions and companies and has entered collaborative research in various fields to create innovations.

Consolidation of world class photonics researchers

The Institute’s operations have been designed to allow the director to exercise his powers and enable researchers to achieve global success through the appointment of suitable staff and flexible budget measures. In addition, three world class researchers, who are actively engaged in the field of photonics, have been invited to join the Institute. Dr. Hideki Hirayama, Chief Scientist (RIKEN), developer of the world’s most efficient deep ultraviolet LED, Prof. Kaoru Minoshima (University of Electro-Communications), developer of the world’s first optical comb measurement technology, and Dr. Takuo Tanaka, Chief Scientist (RIKEN), the world’s leading 3D metamaterial developer, are the scientists leading the Institute’s core research work and providing guidance to research students.



Optical experiment.

What is “Post-LED Photonics”?

The term “Post-LED Photonics” was coined to denote the newly developed practical light sources of “deep ultraviolet,” “infrared,” and “terahertz,” which are being hailed as next-generation light. In the range of visible light that we customarily recognize as “light,” inexpensive LEDs are being produced on a mass scale and made available in the marketplace; they are being widely used in familiar products such as lighting fixtures and displays. However, visible light is only a small part of “light”, which has a very wide range of wavelengths; and wavelength ranges such as “deep ultraviolet”, “infrared”, and “terahertz” extend on the short wavelength and long wavelength sides of visible light. As light in these wavelength regions exhibits characteristic material interactions that are very different from those of visible light, its applications are essentially different from those of visible light. Some of the expected areas of application include ultra-high-speed wireless communication such as “Be-

yond 5G”, sensing technology for fully automatic driving of vehicles, scanning technology inside aging infrastructure, and regenerative medicine. We have been pursuing research and development into some of the possible applications of invisible light.

A base for medical-optical fusion research

Another mainstay of the new institute is the promotion of medical-optical fusion research. Tokushima University is the only university in Japan that serves the fields of medical science, dentistry, pharmaceutical science, nutritional science, and healthcare, all under the same roof. We are therefore taking on challenges such as the development of new medical techniques through fusion research of optics and medicine that will help to prolong healthy life expectancy and enhance quality of life (QOL). Some of these measures include the development of new endoscopic diagnosis and phototherapy for cancer using special light, medical examination using saliva and breath, and the development of new biomarker phosphors, among others.

RESEARCH DIVISION

Department of Post-LED Photonics Research

This division is working on the development of next-generation practical light sources in the deep ultraviolet/infrared/terahertz wavelength regions and research on their applications. In addition to photonics researchers, researchers in areas such as chemistry, biology, concrete engineering, and informatics join forces to promote the development of applied products in a wide range of fields.



Dark room optics laboratory.

Affiliated researchers: 14 full-time faculty members, 1 researcher, 11 concurrent faculty members.

Department of Interdisciplinary Researches for Medicine and Photonics

Utilizing the University's environment in which the fields of medical, dental, and pharmaceutical sciences are all available concurrently, this division is promoting fusion research that incorporates photonics into new medical and biomedical sciences. The aim of our research is to contribute to the realization of a society of healthy and active people through early detection and treatment of diseases.

Affiliated researchers: 3 full-time faculty members, 6 concurrent faculty members.



Takeshi Yasui completed the doctoral program at the Department of Production Development Engineering, Graduate School of Engineering, Tokushima University, in 1997 and earned doctorate in Engineering. He also received doctorate in Medical Science by way of Dissertation from Nara Medical University. In 2010, He became a professor of Institute of Technology and Science at the Tokushima University. In 2016, He was appointed as Vice Director in charge of Research Organization. Since March 2019, he serves as Director of Institute of Post-LED Photonics after its establishment. He developed the world's first dual terahertz comb spectroscopy.