

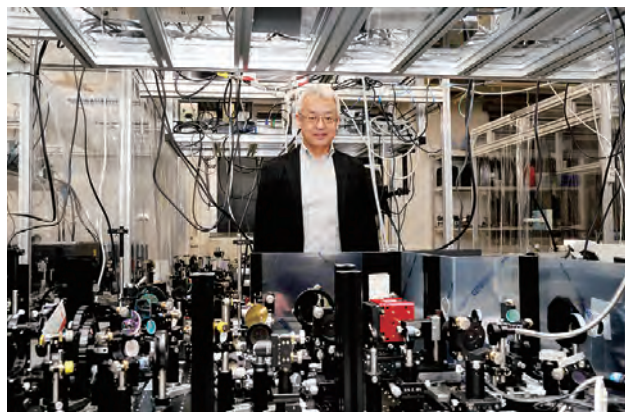
# ICR News 2020

## Grant-in-Aid for Specially Promoted Research

### Title of Project: Fusing Nanomaterials and Strong Electric Field Nonlinear Optics for New Advances in Photonics

■ Prof KANEMITSU, Yoshihiko

Based on its expertise in optics and nanoscience, the laboratory of Professor Yoshihiko Kanemitsu has been studying the optical properties of new solid crystals and nanomaterials. Following its previous work (funding sources include Grant-in-Aid for Scientific Research, Kakenhi, in 2008, the SEI Group CSR Foundation in 2011, and Strategic Basic Research Program Grants, JST-CREST, in 2011 and 2016.), the Kanemitsu group started a new project in April 2019. The project involves the fabrication of nanomaterials and crystal structures with unique electronic properties. Applying ultrafast laser spectroscopy with a set electric field phase to these materials will lead to new strong electro-optics and quantum photonics technologies. The key words of the research are “light phase” and “electron phase”. By manipulating the movement of electrons in matter with a laser electric field, new nonlinear optical phenomena are expected. We appreciate your support.



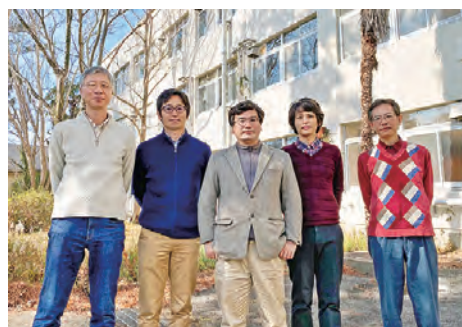
## Challenge for the Complete Utilization of Solar Energy

■ Assoc Prof SAKAMOTO, Masanori

Sun is the most important energy source supporting life on Earth and human activities. However, solar light in the IR region, which makes up almost half of all solar energy, has been untapped by neither natural photosynthesis nor artificial photo-energy conversion systems. The development of technology, which allows us to utilize the energy of solar light in the IR region, will provide a vast energy source for human society.

The utilization of IR light realizes energy production in harmony with nature in the truest sense. Because nature does not utilize the IR light as an energy source, utilization of IR energy does not compete with natural photosynthesis or conventional artificial photo-energy conversion systems like photovoltaics. Furthermore, the invisibility of IR light paves the way to the development of unique devices such as transparent photovoltaic glass which can be applied to the windows of the skyscrapers.

The project team of Masanori Sakamoto is challenging the utilization of untapped IR lights from the viewpoint of developing both a new field of science and the next-generation solar industry. Through the interdisciplinary collaboration with Prof. Koji Tanaka (iCems, Kyoto University), Katsuaki Kobayashi (Osaka City University), Mitsuhiro Arisawa (Osaka University), Akira Yamakata (Toyota Institute of Technology), and Akihiro Furube (Tokushima University), we will construct new scientific fields realizing the untrodden complete utilization of solar energy.



## ICR's Supercomputer System Renewed

■ Prof OGATA, Hiroyuki

The supercomputer system of ICR has been helping computational studies in broad areas of chemistry and biology, and continuously performing its special mission to provide biological database services through GenomeNet since 1992. The system is designed to serve not only experts in computational studies but also experimental researchers by supplying an array of user-friendly software and databases. In January 2020, the supercomputer system has experienced its sixth replacement. The renewed system is composed of two nodes of shared memory machines (48 TB memory and 1152 CPU cores in total) and a computer cluster (142 nodes including 18 GPU nodes, 5680 CPU cores in total) connected through a fast network (100 Gbps InfiniBand). Its storage system comprises a distributed file system (6.1 PB) and a network file system (2.3 PB). Finally, the system provides and maintains KEGG, a prominent database in life science developed in ICR since 1995.



The shared memory system and the high-performance computer cluster.



The robust network file system that stores user data and the databases of GenomeNet.



The distributed file system allowing high-speed file access is used for big data computations.

## News from International Public Relations

### ICR Hosted Three Student Awardees from Mongolia

On the occasion of *KAPLAT Talent-Spot 2019 Ulaanbaatar* held in September 2019, KAPLAT Travel Award was presented to 3 top-performing students out of 16 student candidates from Mongolia. In January 2020, the awardees, all of whom were coincidentally from the National University of Mongolia, were invited to participate in a week-long research training at the laboratory of their utmost interest at ICR, Kyoto University. At the conclusion of the training program, each of the awardees gave a short presentation of their research experience at ICR, and the best presentation award went to Manchir Tserendagva. She eventually joined an ICR laboratory as a MEXT scholar and now pursues a Master's degree from Kyoto University.



### JST Sakura Science Plan

Sakura Science Plan is an international exchange program of JST, which provides young Asian students with science and technology experience in Japan. With the support of this project, ICR invited four undergraduate students from the National University of Mongolia in February 2020. They spent one week in the lab of their choice and had opportunities to do experiments with leading researchers at state-of-the-art research facilities, to which they have little or no access back home. These experiences triggered their motivation to study at Kyoto University for an advanced degree in the near future.

