

## **LASER RESEARCH CENTER (LRC)**

### **About the Center:**

Fundamental processes in the microcosm are extremely fast, ranging from hundreds of picoseconds to a few tens of attosecond, making accessing and understanding their dynamic behavior in their natural timescales difficult. However, advances in laser technology have made it possible to access and probe such extremely fast events occurring in atoms, molecules, and solids in the last few decades. Ultrafast lasers are now a tool for observing, control and exploits previously inaccessible microscopic dynamics in various media.

With the support of the Asian Development Bank, the Laser Research Center (LRC) was established at National University of Mongolia in 2018 to combine and advance this frontier further. We can conduct a wide range of experiments with these cutting-edge ultrashort laser sources.

The LRC collaborates with a number of local and international research groups and centers. The LRC has one principal investigator, four senior scientists, and five graduate students on its staff. Senior scientists and postdoctoral researchers hold degrees from developed countries such as the United States, Germany, Canada, and South Korea, among others.

The laser research team has commissioned the laboratory equipment for normal functioning, developed a standard method for pump-probe using ultra-short pulse lasers, a spectral-resolved pump-probe spectrometry method, and successfully conducted the first experiments on semiconductor materials.

### **Laboratory's equipments:**

The LRC has a commercial Ti:sapphire fs laser oscillator and a high-energy, high-repetition rate laser amplifier system, and other crucial instruments for ultrafast laser laboratories

- Solstice Ace High-Energy Ultrafast Amplifiers, Femtosecond Laser
- Ultra-Broadband Few-Cycle Pulse Oscillators Rainbow 2
- Millennia eV, continuous wave green laser
- Fourier Transform Infrared Spectroscopy
- Laser Micro Machining System
- Electromagnet
- Spectrometer

### **Research areas:**

The main research topics of our researchers are the study of induced states caused by the action of light in solids and liquids, the development of short-pulse laser spectroscopy, nonlinear phenomena, quantum optical studies, and the

study of new laser materials, and more. The following research topics are being actively pursued by LRC:

- Development of Ti:sapphire based femtosecond laser oscillator
- Study of ultrafast phenomena in solids using pump-probe technique
- Generation of high-energy, ultrashort laser pulses from thin solid plates
- Development of surface plasmon method for the characterization of biological samples
- Theoretical study of various phenomena in the ultrafast time scales to better understand them.
- Femtomagnetism

#### **International cooperation:**

The Laser Research Center collaborates with foreign universities and academic institutions through joint research projects, exchanging scientific information, organizing conferences and seminars. We collaborate with the following institutions.

- Institute of Physics and Astronomy of Potsdam University, Germany
- B.I.Stefanov Institute of Physics of the National Academy of Sciences of Belarus, Belarus
- Inner Mongolia Key Laboratory for Physics and Chemistry of Functional Materials, Inner Mongolia Normal University, China
- Irkutsk Branch of ILP SB, Russian Academy of Sciences, Russia
- Institute of Physics of Chinese Academy of Sciences, China

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