



**Graduate School of Engineering,  
Division of Electrical, Electronic, and Information Engineering  
Laboratory for High Energy Density Sciences (Kodama Lab.)**



**Research Activities**

URA : <http://www.eie.eng.osaka-u.ac.jp/ef/index.html>

We are exploring High Energy Density (HED) science with high-power lasers and x-ray free electron lasers(XFEL). Novel mater, material and devices are being developed utilizing the high energy density states, which has never existed at ambient condition on the earth:

- **Development of a plasma photonic device and its applications**  
Development of a laser accelerator with plasma fibers and its application such as a super transmission electron microscope and a table top XFEL, Intense THz radiation source with a plasma device and exploring of nonlinear optics in vacuum with a plasma mirror.
- **Creation of matter and material in extreme states or high energy density solid states**  
Control of extreme pressures conditions, resulting in creation of super-diamond, which could be harder than normal diamond, solid metallic hydrogen, which would contain a large density of hydrogen and other novel matter, which would be existed in the super earth.

These research subjects could not make progress only in the filed of photon science and plasma science but also in the large fields of sciences such as vacuum quantum physics, geophysics, material science, high pressure physics and chemistry, beam and other sciences. Experimental approaches on these studied are conducted using high power laser facilities including XFEL in the world under the domestic and International corporations.

**Staff**

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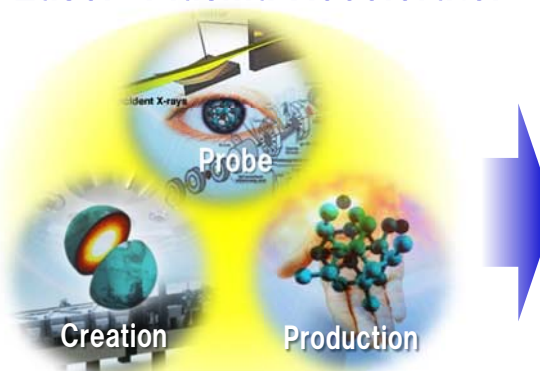
**Plasma Photonic Devices**  
Ultra-high Fields Ultra-high Pressure



High-Power Laser XFEL

Laser and Plasma Technology

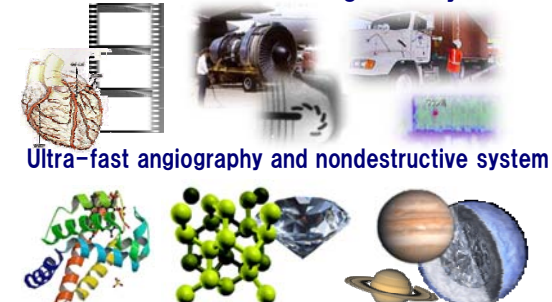
**Laser-Plasma Accelerator**



Creation Production  
**Creation of Novel Matter**

Control of High Pressure and Intense Beam

**Ubiquitous Advanced Medical Diagnostics and Nondestructive Investigation System**



Ultra-fast angiography and nondestructive system

Drug discover, creation of novel material, exploring of matter in Super-earth

•Exploring and Creation of Undiscovered Material

Health Promotion • Safety and Security • Intellectual Curiosity