





光科学普及のための先端施設供用(1)

Advanced instruments for Dissemination of Photon Science (1)

Instrument	Performance (Specification)	Usage
Attosecond Phase Modulator (APM) (IMS)	Tuning the timing of two femtosecond laser pulses with stability and resolution on the attosecond timescale.	<ul style="list-style-type: none"> •Quantum information processing •Chemical reaction control
Sub-10 fs kHz Ti:Sapphire laser (IMS)	<ul style="list-style-type: none"> •Energy: 1 mJ /pulse •Pulse Width: <10 fs •Wavelength: 800 nm •Repetition rate: 1 Hz 	<ul style="list-style-type: none"> •Ultrafast spectroscopy •Time-resolved Coulomb explosion imaging •Photoelectron spectroscopy •Electron-ion coincidence measurement
Quantum holography (IMS)	Generating an arbitral superposition of wavefunctions of matter and measuring the temporal evolutions of their amplitudes and phases on the femtosecond timescale. Adaptive learning control available.	<ul style="list-style-type: none"> •Quantum information processing
Scanning near-Field Optical Microscope (IMS)	(IMS) A near-field optical microscope based on the apertured optical fiber probe. Near-field transmission, emission, Raman, two-photon excitation, ultrafast, and other measurements of the samples are feasible.	Measurements of nanomaterials
Single-longitudinal-mode nanosecond pulsed laser (IMS)	Energy: 20 mJ/pulse Pulse duration: 4 ns Band width: 200 MHz Wavelength: 700-850nm (SHG, THG available) Repetition rate: 30 Hz	High-resolution spectroscopy Chemical analysis
Fabrication facilities of micro solid-state photonics (IMS)	<ul style="list-style-type: none"> •Laser Material Investigation (Spectroscopy, Thermo-mechanical properties) •Micro-Domain Controlling (Laser ceramics, laser medium bonding and QPM process) 	Laser Research and Development.
J-KAREN laser (JAEA) 	<ul style="list-style-type: none"> •Energy: 1 J (*4 J) •Pulse Width: 30 fs (*40 fs) •Power: 30 TW (*100 TW) •Wavelength: 800 nm •Repetition rate: 10 Hz(Maximum) 1 Hz, (*1shot/30min.) •Pulse width: 40 fs * : with Booster amp. 	<ul style="list-style-type: none"> •Experiments of high intensity field science •Electron acceleration •Proton acceleration •Ion acceleration •short pulse X-ray generation, etc •Control of chemical reaction, excitation
kHz titanium sapphire laser (JAEA) 	<ul style="list-style-type: none"> •Repetition rate: 1kHz •Pulse energy: 2 mJ 	<ul style="list-style-type: none"> •THz generation, etc.
X-ray laser (JAEA) 	<ul style="list-style-type: none"> •Wavelength: 13.9 nm •Pulse width: about 10 ps •Output energy: ~μJ/1Pulse 	<ul style="list-style-type: none"> •Observation of material •Irradiation of soft X-ray nano beam •Irradiation of high luminance soft X- rays, etc.

光科学普及のための先端施設供用(2)

Advanced instruments for Dissemination of Photon Science (2)

Instrument	Performance (Specification)	Usage
Microtron accelerator (JAEA) 	<ul style="list-style-type: none"> • Electron beam accelerator • Energy: 150 MeV • Pulse width: 10 ps (FWHM) • Electric charge: ~100 pC • Emittance: 6π mm mrad • Repetition rate: 10 Hz 	<ul style="list-style-type: none"> • Electron acceleration research with laser • γ(X)-rays generation with laser, etc.
QUADRA-P: High-repetition-rate Yb YAG laser (Osaka U.) 	<ul style="list-style-type: none"> • Yb fiber oscillators (1030 nm, 40 fs) • Cryogenically cooled, LD pumped Yb: YAG ceramic amplifier • Wavelength: 1030 nm • Pulse energy: >1 J (CPA mode) • pulse width: ~10 ps • Repetition rate: 100-300 Hz 	<ul style="list-style-type: none"> • Yb fiber CPA technology (1030 nm) • High-power pump source of OPA/OPCPA • Material/optic testing under low temperature • High-average-power coherent EUV source (future collaboration with JST-CREST) • Pump-probe experiments • Material processing with ultrashort pulse
Ceramic and fiber material fabrication (Osaka U.) 	<p>Ceramic fabrication</p> <ul style="list-style-type: none"> • Electric furnace ($\sim 2,000^\circ\text{C}$, $\leq 10^{-4}$ Pa, Ar/N₂) • Synthesis process tools • Centrifuge (22,000 rpm, 4 liters) <p>Optical fiber drawing machine</p> <ul style="list-style-type: none"> • Single mode silica fiber • Rod fiber 	<p>Ceramic fabrication</p> <ul style="list-style-type: none"> • Laser YAG ceramic (Yb, Nd, Nd/Cr, Nd/Cr/Ce) • Scintillator (Ce: YAG, etc.) • Composite ceramic (collaboration with JAEA) • Ceramic powder with Sol-Gel method • Optical fiber drawing • New fiber laser materials
LD-pumped 10-Hz glass laser (Osaka U.) 	<ul style="list-style-type: none"> • Yb fiber oscillators (1050 nm, ≤ 30 fs), CEP stabilized Ti:sapphire oscillator (800 nm, 4.5 fs) • Yb fiber CPA • LD pumped Nd: glass amplifier • Wavelength: 1053 nm • Pulse energy: 8 J (narrow band), 4 J (CPA mode) • pulse width: ≤ 1 ps (≥ 10 TW) • Repetition rate: 10 Hz 	<ul style="list-style-type: none"> • Yb PCF fiber CPA technology (1053 nm) • High-power pump source of OPA/OPCPA • Laser plasma interaction • Pump-probe experiments (10 kHz fiber CPA/SHG, sub mJ)
P3 Laser (Osaka U.) 	<ul style="list-style-type: none"> • Ti:Sapphire Laser • Output Energy : 1 J /Pulse • Pulse Width : 25 fs (FWHM) • Power : 40 TW • Wavelength : 800 nm • Typical contrast 10^8 • Repetition rate : 10 Hz(Maximum) 	<ul style="list-style-type: none"> • High field physics • Particle acceleration / sources • Ultra-short, intense radiation sources, etc.
Laser lithography (Kyoto U.) 	<ul style="list-style-type: none"> • He-Cd laser • Substrates up to 200 x 200 mm² • Structures down to 0.6 μm • Address grid down to 50 nm • Multiple data input formats (DXF, CIF, GDSII, Gerber, BMP, Ascii, STL) 	<ul style="list-style-type: none"> • Direct patterning on resist with sub-micron resolution • Fabrication of masks for photolithography
Optical thin film coater (Kyoto U.) 	<ul style="list-style-type: none"> • Two electron-beam guns • Substrates up to $\phi 100$ mm • Thickness monitor • RF applicable 	<ul style="list-style-type: none"> • Optical thin film coating
Excimer laser scriber (Kyoto U.) 	<ul style="list-style-type: none"> • Kr-F excimer laser (248 nm) • 10 mJ, 300 Hz • Substrates up to 200 x 200 mm² • Input data format: DXF 	<ul style="list-style-type: none"> • Patterning with micron-order resolution • Laser lift-off