

Application Papers using IMRA Lasers 1998- Present

1998

Simultaneous measurements of Cytosolic and Mitochondrial Ca ²⁺ transients in HT-29 cells	S. Ricken, J. Leipziger, R. Greger, R. Nitschke	J. Biolog. Chem. Vol. 273, No. 52, pp. 24961-34969	Loading of HT-29 cells with the Ca ²⁺ dye fura-2/AM resulted in a nonhomogeneous intracellular distribution of the dye. Cellular compartments with high fura-2 ...
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1999

Third-harmonic generation microscopy by use of a compact, femtosecond fiber laser source	A.C. Millard, P.W. Wiseman, D.N. Fittinghoff, K.R. Wilson, J.A. Squier, M. Muller	Appl. Opt. Vol. 38, No. 36, pp. 7393-7397	We demonstrate the first use, to our knowledge, of a compact, diode-pumped, femtosecond fiber laser for third-harmonic generation (THG) microscopy. We discuss ...
Simultaneous generation of wavelength tunable two-colored femtosecond soliton pulses using optical fibers	N. Nishizawa, R. Okamura, T. Goto	IEEE Phot. Tech. Lett. Vol. 11, No. 4, April 1999	Wavelength tunable two-colored femtosecond (fs) soliton pulse generation is proposed and demonstrated for the first time, using passively mode-locked fs fiber laser and ...
Compact system of wavelength-tunable femtosecond soliton pulse generation using optical fibers	N. Nishizawa, T. Goto	IEEE Phot. Tech. Lett. Vol. 11, No. 3, pp. 325-327	Using passively mode-locked femtosecond (fs) fiber laser and polarization maintaining fibers, the compact system of wavelength-tunable femtosecond (fs) fundamental ...

2000

Bit error rate performance of ultrashort-pulse optical CDMA detection under multi-access interference	S. Shen, A.M. Weiner, G.D. Sucha, M.L. Stock	Elec. Lett. Vol. 36, No. 21, pp. 1795-1797	The first system measurement on the bit error rate performance of an ultrashort-pulse optical CDMA channel under multi-access interference is reported. Effective ...
Characteristics of wavelength tunable femtosecond soliton pulse generation using femtosecond pump laser and polarization maintaining fiber	Y. Matsuo, N. Nishizawa, M. Mori, T. Goto	Opt. Rev. Vol. 7, No. 4, pp. 309-316	We have investigated both experimentally and numerically the characteristics of wavelength tunable femtosecond soliton pulse generation using a pulse width variable ...
Detection of terahertz radiation with low-temperature-grown GaAs-based photoconductive antenna using 1.55 um probe	M. Tani, K.-S. Lee, X.-C. Zhang	Appl. Phys. Lett. Vol. 77, No. 9, pp. 1396-1398	THz radiation is detected by a low-temperature-grown GaAs ~LT-GaAs photoconductive antenna probed with a 1.55 mm probe laser. The detection efficiency is found ...
Development of intense and compact Thz-radiation source using femtosecond-laser irradiated InAs emitter in a high magnetic field	H. Ohtaka, S. Ono, M. Sakai, E. Kawahata, T. Kozeki, H. Murakami, Z. Liu, T. Tsukamoto, N. Sarukura	J. Chinese Chem. Soc. Vol. 47, pp. 609-614	THz-radiation power from femtosecond pulse irradiated InAs is found to be saturated at the magnetic field around 3T. We have found this saturation magnetic field ...
High-accuracy measurement of 240-m distance in an optical tunnel by use of a compact femtosecond laser	K. Minoshima, H. Matsumoto	Appl. Opt. Vol. 39, No. 30, pp. 5512-5517	A high-accuracy optical distance meter with a mode-locked femtosecond laser is proposed for distance measurements in a 310-m-long optical tunnel. We measured the phase ...
Measurement of chromatic dispersion of optical fibers using wavelength-tunable soliton pulses	N. Nishizawa, A. Muto, T. Gogo	Jpn. J. Appl. Phys. Vol. 39, No. 8, pp. 4990-4992	The chromatic dispersion of optical fibers is measured using a compact wavelength-tunable soliton pulse generation system. In this system , and ultrashort ...
Measurement of timing jitter in wavelength tunable femtosecond soliton pulses	Y. Matsuo, N. Nishizawa, M. Mori, T. Goto	Opt. Rev. Vol. 7, No. 4, pp. 317-322	We investigated the root mean square (RMS) timing jitter and RMS intensity noise of the wavelength tunable femtosecond soliton pulses using the technique of ...
Optical frequency link between an acetylene stabilized laser at 1542 nm and an Rb stabilized laser at 778 nm using a two-color mode-locked fiber laser	A. Onae, T. Ikegami, K. Sugiyama, F.-L. Hong, K. Minoshima, H. Matsumoto, K. Nakagawa, M. Yoshida, S. Harada	Opt. Comm. Vol. 183, No. 1-4, pp. 181-187	Optical frequency link of two frequency-stabilized laser diodes operating at 1542 nm (a rotational-vibrational line of isotope acetylene molecule) and 778 nm (an Rb two ...

2000 (Continued)

Two-photon photocurrent imaging of vertical cavity surface emitting lasers	C. Xu, L.M.F. Chirovsky, W.S. Hobson, J. Lopata, W.H. Knox	Appl. Phys. Lett. Vol. 76, No. 12, p. 1510-1512	We show that two-photon photocurrent imaging can be used to nondestructively study vertical cavity surface emitting lasers on a microscopic level. In particular, ...
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2001

Electronically controlled high-speed wavelength-tunable femtosecond soliton pulse generation using acoustooptic modulator	T. Hori, N. Nishizawa, H. Nagai, M. Yoshida, T. Goto	IEEE Phot. Tech. Lett. Vol. 13, No. 1, pp. 13-15	The compact system of electronically controlled highspeed wavelength-tunable femtosecond (fs) soliton pulse generation is realized for the first time using a passively ...
Far-infrared phonon-polariton dispersion of ferroelectric bismuth titanate probed by THz time domain spectroscopy	S. Kojima, N. Tsumura, M.W. Takeda, S. Nishizawa	Anal. Sci. Vol. 17(ICAS2001), pp. i681-i684	The polariton-dispersion was studied by the terahertz time domain spectroscopy for a high-quality ferroelectric bismuth titanate crystal plate, the phase delay was ...
Generation of high-repetition-rate WDM pulse trains from an arrayed-waveguide grating	D.E. Leaird, S. Shen, A.M. Weiner, A. Sugita, S. Kamei, M. Ishii, K. Okamoto	IEEE Phot. Tech. Lett. Vol. 13, No. 13, pp. 221-223	We present what we believe to be the first demonstration of femtosecond pulse train generation from an arrayed-waveguide grating. Terahertz-rate bursts of ...
Terahertz wave dispersion in two-dimensional photonic crystals	H. Kitahara, N. Tsumura, H. Kond, M.W. Takeda, J.W. Haus, Z. Yuan, N. Kawai, K. Sakoda, K. Inoue	Phys. Rev. B Vol. 64, No. 4, p. 045202	Square and triangular lattice photonic crystals were fabricated by drilling holes in a methylpentene polymer. The amplitude and phase shift of transmission spectra ...
Widely broadened super continuum generation using highly nonlinear dispersion shifted fibers and femtosecond fiber laser	N. Nishizawa, T. Goto	Jpn. J. Appl. Phys. Vol. 40, pp. L365-L367	1.25 – 1.95 μm widely broadened and almost flat super continuum is generated using only 5-m-long polarization maintaining highly nonlinear dispersion shifter fiber ...
Widely wavelength-tunable ultrashort pulse generation using polarization maintaining optical fibers	N. Nishizawa, T. Goto	IEEE J. Quant. Elect. Vol. 7, No. 4, pp. 518-524	Characteristics of widely wavelength tunable ultrashort pulse generation using several types of polarization maintaining fibers have been experimentally analyzed. ...

2002

0.78 - 0.90- μm wavelength-tunable femtosecond soliton pulse generation using photonic crystal fiber	N. Nishizawa, Y. Ito, T. Goto	IEEE Phot. Tech. Lett. Vol. 14, No. 7, pp. 986-988	A compact system of 780 - 900-nm wavelength tunable femtosecond soliton pulse generation is demonstrated for the first time using a fiber laser, periodically poled ...
1-THz bandwidth C- and L-band optical sampling with a bit rate agile timebase	R.L. Jungerman, G. Lee, O. Buccafusca, Y. Kaneko, N. Itagaki, R. Shioda, A. Harada, Y Nihei, G. Sucha	IEEE Phot. Tech. Lett. Vol. 14, No. 8, pp. 1148-1150	A fast optical sampling system operating over a wide range of wavelengths and modulation bit rates is needed for characterizing high-speed communications signals. ...
All-optical analog-to-digital converter by use of self-frequency shifting in fiber and a pulse-shaping technique	T. Konishi, K. Tanimura, K. Asano, Y. Oshita	JOSA B Vol. 19, No. 11, pp. 2817-2823	We propose a new/, to our knowledge, method for an all-optical analog-to-digital converter by using self-frequency shifting in a fiber and a pulse-shaping technique. ...
New Application of terahertz time-domain spectrometry (THz-TDS) to the phonon-polariton observation on ferroelectric crystals	S. Nishizawa, N. Tsumura, H. Kitahara, M.W. Takeda, S. Kojima	Phys. Med. Biol. Vol. 47, No. 21, p. 3771	A new instrument for Terahertz time-domain spectroscopy (THz-TDS) has been developed. It consists of a composite THz-TDS system and a high throughput (Martin-Puplett) ...
Novel ultrashort pulse fiber lasers for micromachining applications	H. Endert, A. Galvanauskas, G. Sucha, R. Patel, M. Stock	RIKEN Rev. 2002, No. 43, pp. 23-27	The development of ultrashort pulse laser technology will have a strong impact on the advancement of laser machining. Ultrashort laser pulses can reduce the ...
Spectroscopy by pulsed terahertz radiation	M. Hangyo, T. Nagashima, S. Nashima	Meas. Sci. Technol. Vol. 13, No. 11, pp. 1727-1738	Spectroscopies using terahertz (THz) radiation excited by ultrashort laser pulses have been rapidly developing recently. In this paper, the principles of various types ...

2002 (Continued)

Terahertz time domain spectroscopy of phonon-polariton in ferroelectric bismuth titanate	S. Kojima, N. Tsumura, M. Wada Takeda, S. Nishizawa	Ferroelectrics Vol. 272, No. 1, pp. 99-104	This paper reports the first application of the terahertz time domain spectroscopy to phonon polariton dispersion. In order to determine polariton-dispersion of a high-quality ...
Ultrafast optical switching properties of single-wall carbon nanotube polymer composites at 1.55 μm	Y.-C. Chen, N.R. Raravikar, L.S. Schadler, P.M. Ajayan, Y.-P. Zhao, T.-M. Lu, G.-C. Wang, X.-C. Zhang	Appl. Phys. Lett. Vol. 81, No. 6, p. 975	Using a pump-probe method with a 150 fs laser at the wavelength of 1.55 μm , we have experimentally demonstrated that single-walled carbon nanotubes ...
Wavelength-agile fiber laser using group-velocity dispersion of pulsed super-continua and application to broadband absorption spectroscopy	S.T. Sanders	Appl. Phys. B Vol. 75, No. 6-7, pp. 799-802	A swept-wavelength source is created by connecting four elements in series: a femtosecond fiber laser at 1.56 μm , a non-linear fiber, a dispersive fiber and a tunable spectral ...

2003

Broad-spectrum frequency comb generation and carrier-envelope offset frequency measurement by second-harmonic generation of a mode-locked fiber laser	F.-L. Hong, K. Minoshima, A. Onae, H. Inaba, H. Takada, A. Hirai, H. Matsumoto, T. Sugiura, M. Yoshida	Opt. Lett. Vol 28, No. 17, pp. 1516-1518	A frequency comb spanning more than one octave has been achieved by injecting the second-harmonic generation (780 nm) of a mode-locked fiber laser ...
Carrier dynamics in InGaAs with embedded ErAs nanoislands	A.K. Azad, R.P. Prasankumar, D. Talbayev, A.J. Taylor, R.D. Averitt, J.M.O. Zide, H. Lu, A.C. Gossard, J.F. O'Hara	Appl. Phys. Lett. Vol. 93, No. 12, p. 121108	Using time-resolved optical-pump terahertz-probe spectroscopy, we study the ultrafast carrier dynamics in $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}:\text{ErAs}$, a potential candidate for 1550 nm ...
Complex dispersion relation of phonon-polariton in stoichiometric LiNbO_3	S. Kofiuma, H. Kitahara, S. Nishizawa, M.W. Takeda	physica status solidi Vol. 1, No. 11, pp. 2674-2677	Complex polariton dispersion relations were studied in the nearly stoichiometric lithium niobate crystals grown by ...
Fabrication of three-dimensional microstructure in optical-gain medium using two-photon-induced photopolymerization technique	S. Yokoyama, T. Nakahama, H. Miki, S. Mashiko	Thin Solid Films Vol. 438-439, pp. 452-456	An approach using a laser-dye-doped dendrimer as a two-photon-induced photocurable resin was demonstrated for the fabrication of a three-dimensional microstructure. A ...
Far-infrared ferroelectric soft photon-polariton probed by THz time domain spectroscopy	S. Kojima, N. Tsumura, H. Kitahara, M.W. Takeda, S. Nishizawa	Ferroelectrics Vol. 284, No. 1, pp. 21-29	This paper reports the pioneering application of the Terahertz time domain spectroscopy to ferroelectric Bismuth Titanate and Lithium Niobate crystals. By the ...
Far-infrared phonon-polariton dispersion of ferroelectric bismuth titanate probed by THz time domain spectroscopy	S. Kojima, N. Tsumura, M.W. Takeda, S. Nishizawa	Phys. Rev. B Vol. 67, p. 035102	We report observations of the intensity and phase transmission spectra related to phonon-polariton propagation using coherent far-infrared radiation ...
Significant enhancement of terahertz radiation from InSb by use of a compact fiber laser and an external magnetic field	H. Takahashi, Y. Suzuki, M. Sakai, S. Ono, N. Sarukura, T. Sugiura, T. Hirosumi, M. Yoshida	Appl. Phys. Lett. Vol. 82, No. 3, pp. 2005-2007	We investigated the magnetic-field dependence of terahertz (THz) radiation power from InSb. Significant enhancement of THz-radiation power is observed ...
Temporal pulse shaping using fiber laser technology: nano-scaling for flexible industrial laser material processing	R. Patel, M.L. Stock, Z. Sartania, J. Bovatsek, A. Arai, H. Enderit	Proc. SPIE Vol. 4830, pp. 352-356	On the basis of highly efficient Yb: fiber amplifiers, a new technology platform for compact and nearly maintenance-free laser sources from the femtosecond to the ...
Terahertz time domain spectroscopy of complex dielectric constants of boson peaks	S. Kojima, M.W. Takeda, S. Nishizawa	J. Mol. Struct. Vol. 651-653, pp. 285-288	Using THz time domain spectroscopy we have observed both the real and the imaginary parts of complex dielectric constants in the far-infrared region for a glassy ...
Two-photon-induced polymerization in a laser gain medium for optical microstructure	S. Yokoyama, T. Nakahama, H. Miki, S. Mashiko	Appl. Phys. Lett. Vol. 82, No. 19, pp. 3221-3223	We have fabricated a polymeric solid-state microcavity in the laser gain media by a two-photon-induced polymerization technique. The photopolymerization resin ...
Wavelength-agile laser sensors for measuring gas properties in engines	L.A. Kranendonk, A.W. Caswell, A.M. Myers, S.T. Sanders	SAE Trans. Vol. 112, No. 3, pp.1578-1584	Internal combustion engines present a harsh environment for optical sensors, owing to challenges such as high pressures, multiple phases, and window fouling. ...

2003 (Continued)

Wideband and nonmechanical sonogram measurement by use of an electronically controlled, wavelength-tunable, femtosecond soliton pulse	T. Hori, N. Nishizawa, T. Goto, M. Yoshida	JOSA B Vol. 20, No. 11, pp. 2410-2417	We have developed a novel sonogram measurement system with an acousto-optic tunable filter and a nonmechanical cross correlator that uses an ...
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2004

Design of header recognition filter for binary phase shift keying in header recognition unit using time-space conversion	H. Furukawa, T. Konish, Y. Oshita, W. Yu, K. Itoh, Y. Ichioka	Opt. Rev. Vol. 11, No. 2, pp. 119-125	Optical header recognition is one key function that enables ultrafast optical routing in photonic packet-switched networks. Especially, optical header recognition based ...
Developments of optical frequency standards for wavelength-division-multiplexing (WDM) optical fiber communication systems	K. Nakagawa, A. Onae	IEEE Trans. Fund. Mat. Vol. 124, No. 1, pp. 52-55	We have developed optical frequency standards for wavelength-division-multiplexing (WDM) optical communication systems based on absorption lines ...
Extremely simple device for measuring 1.5-um ultrashort laser pulses	S. Akturk, M. Kimmel, R. Trebino	Opt. Expr. Vol. 12, No. 19, pp. 4483-4489	We have demonstrated an experimentally very simple and sensitive GRENOUILLE device for measuring the intensity and phase vs. time and spatio-temporal distortions of ...
Generation and detection of terahertz radiation by electro-optical process in GaAs using 1.56 μm fiber laser pulses	M. Nagai, K. Tanaka, H. Ohtake, T. Bessho, T. Sugiura, T. Hirosumi, M. Yoshida	Appl. Phys. Lett. Vol. 85, p. 3974	We report the generation and detection of a Terahertz wave with a nonresonant electro-optical crystal using 1.56 μm femtosecond laser pulses. Using a 0.5-mm-thick ...
High-resolution wavelength-agile laser source based on pulsed super-continua	J.W. Walewski, S.T. Sanders	Appl. Phys. B Vol. 79, No. 4, pp. 415-418	A high-speed-scanning laser system is presented consisting of three elements in series: an Erbium-fiber femtosecond laser emitting at 1.56 μm, a nonlinear ...
High-throughput characterization of linear and nonlinear optical properties in composition-spread (Sr, Ca) ₂ CuO ₃ thin-films	M. Ohtani, T. Makino, K. Yamamoto, Y. Segawa, T. Fukumura, H. Kasurada, J. Nishimura, H. Koinuma, M. Kawasaki	Appl. Surf. Sci. Vol. 223, No. 1-3, pp. 133-137	We have constructed a high-throughput spectrometer and a nonlinear optical tester used for the characterization of combinatorial thin-film libraries. The optical ...
Impulse responses of submicron GaAs photodetectors	T. Ohno, K. Ishibashi, Y. Aoyagi, Y. Aida	Solid-state Elect. Vol. 48, No. 12, pp. 2159-2163	Metal–semiconductor–metal photodetectors with different submicron spacings (d = 100, 300, 500, 700 and 900 nm) were fabricated on GaAs with a carrier recombination ...
Measurements and numerical analysis for femtosecond pulse deformations after propagation of hundreds of meters in air with water-vapor absorption lines	Y. Yamaoka, L. Zeng, K. Minshima, H. Matsumoto	Appl. Optics Vol. 43, No. 29, pp. 5523-5530	We have clarified the influences of water-vapor absorption lines in air on femtosecond pulse propagations from experimental and theoretical points of view. Precise...
Near-infrared nonlinear optical properties of single-wall carbon nanotubes embedded in polymer film	A.G. Rozhin, Y. Sakakibara, M. Tokumoto, H. Kataura, Y. Achiba	Thin Solid Films Vol. 464-465, pp. 368-372	A free-standing film made of a single-wall carbon nanotube (SWCNT)–polyvinylalcohol (PVA) composite material was fabricated by pretreatment of SWCNTs with ...
Terahertz pulsed imaging and spectroscopy for biomedical and pharmaceutical applications	V.P. Wallace, P.F. Taday, A.J. Fitzgerald, R.M. Woodward, J. Cluff, R.J. Pye, D.D. Arnone	Faraday Discuss. Vol. 126, pp. 255-263	Terahertz (THz) radiation lies between the infrared and microwave regions of the electromagnetic spectrum. Advances in THz technology have opened up many ...
Terahertz radiation from InAs with various surface orientations under magnetic field irradiated with femtosecond optical pulses at different wavelengths	H. Takahashi, M. Sakai, A. Quema, S. Ono, N. Sarukara, G. Nishijima, K. Watanabe	J. Appl. Phys. Vol. 95, No. 9, pp. 4545-4550	We present the magnetic-field dependence of terahertz (THz)-radiation power from femtosecond-laser-irradiated InAs with various surface orientations. Under 800 nm ...
Two-photon-sensitized fluorescence and excitation spectra of photosystem I of Thermosynechococcus Elongatus	M. Hilber, A. Wehlih, E. Schlodder, P.J. Walla	J. Phys. Chem B Vol. 108, No. 34, pp. 13022-13030	In this work, we present the two-photon excitation spectrum and two-photon-sensitized fluorescence spectra of photosystem I (PS I) of Thermosynechococcus ...

2004 (Continued)

Wavelength-agile laser system based on soliton self-shift and its application for broadband spectroscopy	J.W. Walewski, M.R. Borden, S.T. Sanders	Appl. Phys. B Vol. 79, No. 8, pp. 937-940	A novel laser system for rapid-wavelength scanning applications was developed. The wavelength-tuning mechanism is the soliton self-shift of femtosecond ...
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2005

Anisotropic saturable absorption of single-wall Carbon nanotubes aligned in polyvinyl alcohol	A.G. Rozhin, Y. Sakakibara, H. Kataura, S. Masuzaki, K. Ishida, Y. Achiba, M. Tokumoto	Chem. Phys. Lett. Vol. 405, No. 406, pp. 288-293	We dispersed single-wall carbon nanotubes (SWNTs) in polyvinyl alcohol (PVA) film mostly with nanoscale uniformity and mechanically stretched it. Polarized ...
Carbon nanotube-poly (vinylalcohol) nanocomposite film devices: applications for femtosecond fiber laser mode lockers and optical amplifier noise suppressors	Y. Sakakimara, A.G. Rozhin, H. Kataura, Y. Achiba, M. Tokumoto	Jap. J. Appl. Phys. Vol. 44, No. 4A, pp. 1621-1625	We fabricated single-wall carbon nanotube (SWNT)/poly(vinylalcohol) (PVA) nanocomposite freestanding films and examined their application in ...
Complex phonon-polariton dispersion of congruent Lithium Niobate studied by THz time-domain spectroscopy	S. Kojima, S. Nishizawa, H. Kitahara, M.W. Takeda	Ferroelectrics Vol. 314, No. 1, pp. 19-26	Complex polariton dispersion relations were determined in the congruent Lithium Niobate crystal using the latest Terahertz time domain spectroscopy. ...
Core-modified expanded porphyrins with large third-order nonlinear optical response	H. Rath, J. Sankar, V. Prabhuraja, T. K. Chandrashekar, A. Nag, D. Goswami	J. Am. Chem. Soc. Vol. 127, No. 33, pp. 11608-11609	The third-order nonlinear optical response through measurement of two-photon absorption cross-sections (TPACS) for aromatic core-modified expanded porphyrin ...
Fe-implanted InGaAs photoconductive terahertz detectors triggered by 1.56 μm femtosecond optical pulses	M. Suzuki, M. Tonouchi	Appl. Phys. Lett. Vol. 86, No. 16, p. 163504	Performance of InGaAs photoconductive antennas at an excitation wavelength of 1.56 μm has been studied as a terahertz (THz) detector. THz waves in time domain are ...
Fe-implanted InGaAs Terahertz emitters for 1.56 μm wavelength excitation	M. Suzuki, M. Tonouchi	Appl. Phys. Lett. Vol. 86, No. 5, p. 051104	We have measured the Terahertz (THz) radiations from unimplanted and Fe-implanted $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}$ photoconductive switches excited by the femtosecond ...
Heat accumulation effects in femtosecond laser-written waveguides with variable repetition rate	S. Eaton, H. Zhang, P. Herman, F. Yoshino, L. Shah, J. Bovatsek, A. Arai	Opt. Exp. Vol. 13, No. 12, pp. 4708-4716	High-rep rate fs lasers are shown to drive heat accumulation processes that are attractive for rapid writing of low-loss optical waveguides in transparent glasses. ...
Terahertz time-domain spectroscopy of low-energy excitations in glasses	S. Kojima, H. Kitahara, S. Nishizawa, Y.S. Yang, M.W. Takeda	J. Molec. Struct. Vol. 744-747, pp. 243-246	The low-energy excitations in glasses were studied by the Terahertz time-domain spectroscopy (THz-TDS). The coherent THz radiation by a femto-second pulse laser ...
Waveguide writing in fused silica with a femtosecond fiber laser at 522 nm and 1 MHz repetition rate	L. Shah, A. Arai, S. Eaton, P. Herman	Opt. Exp. Vol. 13, No. 6, pp. 1999-2006	We report on waveguide writing in fused Silica with a novel commercial femtosecond fiber laser system (IMRA America, FCPA μJewel). The influence of a range of ...

2006

A spectroscopic comparison of femtosecond-laser-modified fused Silica using kiloHertz and MegaHertz laser systems	W.J. Reichman, D.M. Krol, L. Shah, F. Yoshino, A. Arai, S.M. Eaton, P.R. Herman	J. Appl. Phys. Vol. 99, No. 12, pp. 123112-123116	Waveguides were written in fused Silica using both a femtosecond fiber laser with a 1 MHz pulse repetition rate and a femtosecond amplified Ti:Sapphire laser with a ...
Evaluation of a femtosecond fiber laser for two-photon fluorescence correlation spectroscopy	J.R. Unruh, E.S. Price, R.G. Molla, R. Hui, C.K. Johnson	Microsc. Res. Tech. Vol. 69, pp. 891-893	This work evaluates a femtosecond fiber laser for use in two-photon fluorescence fluctuation spectroscopy. Fiber lasers present an attractive alternative to Ti:Sapphire ...
Generation of correlated photons in nanoscale Silicon waveguides	J.E. Sharping, K.F. Lee, M.A. Foster, A.C. Turner, B.S. Schmidt, M. Lipson, A.L. Gaeta, P. Kumar	Opt. Exp. Vol. 14, No. 25, pp. 12388-12393	Generation of correlated pairs of photons through four-wave mixing (FWM) in embedded Silicon waveguides, designed to exhibit anomalous group-velocity ...

2006 (Continued)

High sensitive measurements of absorption coefficient and optical nonlinearities with a single experimental setup	S. Abbas Hosseini, A. Sharan, D. Goswami	Opt. Comm. Vol. 261, No. 1, pp. 158-162	Accurate knowledge of absorption coefficient of a sample is a prerequisite for measuring the third order optical nonlinearity of materials, which could become a serious ...
Joining of thin glass with semiconductors by ultra-fast high-repetition laser welding	A. Horn, I. Mingaev, A. Werth, M. Kachel	Proc. SPIE Vol. 6880, p. 68800A	Lighting applications like OLED or on Silicon for electro-optical applications need a reproducible sealing process. The joining has to be strong\, the permeability for ...
Label-free affinity assays by rapid detection of immune complexes in submicrometer pores	J.D. Uram, K. Ke, A.J. Hunt, M. Mayer	Angew. Chem. Vol. 118, pp. 2339-2343	We present herein a method that uses a submicrometer pore to detect and characterize immune complexes consisting of proteins such as Staphylococcal ...
Structure property correlations in alcohols through two-photon absorption cross-section measurements	A. Nag, S. Singh, D. Goswami	Chem. Phys. Lett. Vol. 430, pp. 420-423	Two-photon absorption (TPA) cross-sections of neat alcohols are shown to be a femtosecond laser measurable property with useful structure property correlations ...
Submicrometer pore-based characterization and quantification of antibody-virus Interactions	J.D. Uram, K. Ke, A.J. Hunt, M. Mayer	small Vol. 2, No. 8-9, pp. 967-972	A resistive-pulse sensor (see scheme) employs a submicrometer pore for the detection, characterization, and quantification of the binding of polyclonal antibodies ...
Telecom-band directional coupler written with femtosecond fiber laser	S.M. Eaton, W. Chen, L. Zhang, H. Zhang, R. Iyer, J.S. Aitchison, P.R. Herman	IEEE Phot. Tech. Lett. Vol. 18, No. 20, pp. 2174-2176	A femtosecond laser with 1-MHz repetition rate was optimized to write low-loss waveguides and directional couplers inside bulk borosilicate glass. For the first ...
Terahertz (THz) spectroscopy of Freon-11 (CCl ₃ F, CFC-11) at room temperature	H. Altan, B.L. Yu, S.A. Alfano, R.R. Alfano	Chem. Phys. Lett. Vol. 427, No. 4-6, pp. 241-245	The rotational spectrum for the lowest vibrational mode for CCl ₃ F has been measured in the 0.1 – 2 THz frequency range using a compact time-resolved Terahertz ...
Terahertz absorption spectrum of para and ortho water vapors at different humidities at room temperature	X. Xin, H. Altan, A. Saint, D. Matten, and R.R. Alfano	J. Appl. Phys. Vol. 100, p. 0949025	Terahertz time-domain spectroscopy was used to measure the absorption of water vapor in 0.2–2.4 THz range from low to high humidity at room temperature. The observed ...
Terahertz time-domain spectroscopy for explosive trace detection	S.G. Kong, D.H. Wu	Proc. IEEE Int'l Conf. Comp. Intel. 2006, pp. 47-50	This paper presents Terahertz time-domain spectroscopy for stand-off detection of explosive traces. Despite several well-developed explosive detection techniques ...
Two-photon microscopy with wavelength switchable fiber laser excitation	J.R. Unruh, E.S. Price, R.G. Molla, L. Stehno-Bittel, C.K. Johnson, R. Hui	Opt. Exp. Vol. 14, No. 21, pp. 9825-9831	This work explores the use of two-photon fiber laser excitation (TP-FLEX) as an excitation source for scanning two-photon microscopy. We have further demonstrated ...

2007

"Quill" writing with ultrashort light pulses in transparent optical materials	P.G. Kazansky, W. Yang, E. Bricchi, J. Bovatsek, A. Arai, Y. Shimotsuma, K. Miura, K. Hirao	Appl. Phys. Lett. Vol. 90, p. 151120	A remarkable phenomenon in ultrafast laser processing of transparent materials, in particular, Silica glass, manifested as a change in material modification by reversing the ...
Acoustic limitations on the efficiency of machining by femtosecond laser-induced optical breakdown	S. Lee, J.L. Bull, A.J. Hunt	Appl. Phys. Lett. Vol. 91, No. 2, p. 023111	The authors find an unexpected strong influence of acoustic phenomena on the efficiency of water-assisted femtosecond laser nanomachining. Analysis of ...
Direct-write patterning of Indium-Tin-Oxide film by high pulse repetition frequency femtosecond laser ablation	H.W. Choi, D.F. Farson, J. Bovatsek, A. Arai, D. Ashkenasi	Appl. Optics Vol. 46, No. 23, pp. 5792-5799	Ablation of Indium Oxide doped with Tin Oxide (ITO) from glass substrates is described. Laser pulse energy and focus spot size were varied in single-pulse, single-...
Fabrication of OLED display by an ultrashort laser: selective patterning of thin metal electrode	Y. Ito, Y. Onodera, R. Tanabe, M. Ichihara, H. Kamada	Proc. SPIE Vol. 6458, p. 64580C	Organic light emitting diode (OLED) is now in practical use and also a subject of active research and development. In industrial production of OLED displays, one of the key ...

2007 (Continued)

Femtosecond laser direct writing of optical waveguides in silicone film	S. Nakamura, S. Ho, J. Li, S.M. Eaton, H. Zhang, P.R. Herman	JLMN Vol. 2, No. 3, pp. 189-193	For the first time to the authors' knowledge, optical waveguides have been inscribed in silicone ($[\text{SiO}(\text{CH}_3)_2]_n$) film by ultrafast laser radiation. The 522 nm ...
Fs-Laser structuring of ridge waveguides	D. Wortmann, J. Gottmann	Appl. Phys. A Vol. 92, No. 1, pp. 197-201	Thin films made by PLD from Er:ZBLAN and Nd:Gd ₃ Ga ₅ O ₁₂ , are micromachined to form optical wave guiding structures using Ti:Sapphire and Yb:glass ...
Fusion welding of glass using femtosecond laser pulses with high-repetition rates	I. Miyamoto, A. Horn, J. Gottmann, D. Workmann, F. Yoshino	JLMN Vol. 2, No. 1, pp. 57-63	A femtosecond fiber laser, IMRA America, FCPA μ Jewel D-400, with variable repetition rates between 100 kHz and 5 MHz, was focused with a lens of NA 0.65 into ...
Influence of particle size on fractionation with nanosecond and femtosecond laser ablation in brass by online differential mobility analysis and inductively coupled plasma mass spectrometry	N.J. Saetveit, S.J. Bajic, D.P. Baldwin, R.S. Houk	J. Anal. At. Spectrom. Vol. 23, No. 3, pp. 54-61	A differential mobility analyzer (DMA) passes laser ablation (LA) particles and agglomerates within a narrow range of electrical mobilities to the inductively coupled plasma ...
Manufacturing of Nd:Gd ₃ Ga ₅ O ₁₂ ridge waveguide lasers by pulsed laser deposition and ultrafast laser micromachining	J. Gottmann, D. Wortmann, I. Vasilief, L. Moiseev, D. Ganser	Appl. Surf. Sci. Vol. 254, No. 4, pp. 1105-1110	Laser radiation for deposition of laser active thin films and for micro structuring to define wave guiding structures for fabrication of waveguide lasers. Thin films of crystalline ...
Modulation of cross-correlation traces by pulse-shaping with spatial mask	A.K. De, U.S. Pawar, S.K.K. Kumar, D. Goswami	Curr. Sci. Vol. 92, No. 10	Femtosecond laser pulses with desired complex shapes have been exploited to 'steer' the dynamics of various light-matter interaction processes, ranging from ...
One-pot synthesis of core-modified ruybrin, octaphyrin, and dodecaphyrin: characterization and nonlinear optical properties	R. Kumar, R. Misra, T.K. Chandreshkar, A. Nag, D. Goswami, E. Suresh, C.H. Suresh	Eur. J. Org. Chem. Vol. 2007, No. 27, pp. 4552-4562	Modified 26 π ruybrin, 36 π octaphyrin, and 54 π dodecaphyrin systems have been synthesized in moderately good yields through acid-catalyzed ...
Single-step writing of Bragg grating waveguides in fused Silica with an externally modulated femtosecond fiber laser	H. Zhang, S.M. Eaton, P.R. Herman	Opt. Lett. Vol. 32, No. 17, pp. 2559-2561	For the first time to our knowledge, high-strength 30 dB first-order Bragg grating waveguides were fabricated in bulk fused silica glass in a single-scanning step by ...
Structural modification in Borosilicate glass by use of femtosecond fiber laser at 1.56 μ m	T. Tamaki, W. Watanabe, K. Itoh	JLMN Vol. 2, No. 1, pp. 26-30	By focusing intense femtosecond laser pulses inside a transparent material, one can induce localized structural modifications including a refractive-index change. This ...
Type II high-strength Bragg grating waveguides photowritten with ultrashort laser pulses	H. Zhang, S.M. Eaton, J. Li, A.H. Nejadmalayeri, P.R. Herman	Opt. Exp. Vol. 15, No. 7, pp. 4182-4191	A one-step type II photosensitivity process has been optimized for inscribing strong >30-dB first-order Bragg-gratings during laser formation of buried waveguides ...
Ultrathin amorphous Si layer formation by femtosecond laser pulse irradiation	Y. Izawaa, Y. Izawa, Y. Setsuhara, M. Hashida, M. Fujita, R. Sasaki, H. Nagai, M. Yoshida	Appl. Phys. Lett. Vol. 90, p. 044107	Formation of ultrathin amorphized Si layer by femtosecond laser irradiation is reported in this letter. Below the fluence of ablation threshold, femtosecond laser irradiation ...

2008

Active glass nanoparticles by ultrafast laser pulses	K. Hiromatsu, D.J. Hwang, C.P. Grigoropoulos	Micro & Nano Lett. Vol. 3, No. 4, pp. 121-124	The authors have successfully demonstrated a method employing pulsed-laser ablation of active glass to ...
Broadband directional couplers fabricated in bulk glass with high repetition rate femtosecond laser pulses	W.J. Chen, S. M. Eaton, H. Zhang, P.R. Herman	Opt. Exp. Vol. 16, No. 15, pp. 11470-11480	A femtosecond fiber laser was applied to fabricate broadband directional couplers inside bulk glass for general power splitting application in the 1250 to 1650-nm ...
Characterizing hydration state in solution using Terahertz time-domain total reflection spectroscopy	T. Arikawa, M. Nagai, K. Tanaka	Chem. Phys. Lett. Vol. 457, No. 1-3, pp. 12-17	We propose a novel method to characterize hydration states from dielectric responses of solutions in terahertz (THz) frequency region. Hydration states can be ...

2008 (Continued)

Dynamical detection of optical phase changes during micro-welding of glass with ultra-short laser radiation	A. Horn, I. Mingareev, J. Gottmann, A. Werth, U. Brenk	Meas. Sci. Technol. Vol. 19, p. 015302	Accelerating developments in micro- and nanotechnology require faster, more precise tools for application and diagnostics. A new ultra-fast diagnostics is presented ...
Expanded porphyrins as third order non-linear optical materials: some structure-function correlations	S. Gokulnath, T.K. Chandrashekar	J. Chem. Sci. Vol. 120, No. 1, pp. 137-142	This paper reports the first application of the terahertz time domain spectroscopy to phonon polariton dispersion. In order to determine polariton-dispersion of a high-quality ...
Fabrication of microfluidic networks using a high power femtosecond fiber laser	L. Shah, D.H. Kam, J. Mazumder	SPIE Proc. Vol. 7005, p. 70050E	Photolithography is well established in the fabrication of microfluidic networks; however, it is difficult to fabricate ...
Femtosecond laser fabrication of phase-shifted Bragg grating waveguides in fused Silica	J.R. Grenier, L.A. Fernandes, J.S.Aitchison, P.V.S. Marques, P.R. Herman	Opt. Lett. Vol. 37, No. 12, pp. 2289-2291	Phase-shifted Bragg grating waveguides (PSBGWs) were formed in bulk fused Silica glass by femtosecond laser direct writing to produce narrowband (22 ± 3) pm filters ...
Fs-lentotomy: first <i>in vivo</i> studies on rabbit eyes with a 100 kHz laser system.	S. Schumacher, U. Oberheide, M. Fromm, W. Ertmer, G. Gerten, A. Wegener, H. Lubatschowski	Proc. SPIE Vol. 6844, p. 68440V	Up to now reading glasses are the conventional treatment of presbyopia, an age related effect for every human. According to the Helmholtz theory the reason for the ...
Highspeed manufacturing of periodical surface and in-volume nanostructures by fs-laser direct writing	J. Gottmann, D. Wortmann, N. Brandt	Proc. SPIE Vol. 6879, p. 6879N	Sub wavelength ripples (spacing $< \lambda/4$) perpendicular to the polarisation of the laser radiation are obtained by scanning a tightly focused beam ($\sim 1 \mu\text{m}$) of femtosecond laser ...
<i>In vivo</i> application and imaging of intralenticular femtosecond laser pulses for the restoration of accommodation	S. Schumacher, M. Fromm, U. Oberheide, G. Gerten, A. Wegener, H. Lubatschowski	J. Refract. Surg. Vol. 24, No. 9, pp. 991-995	According to the Helmholtz theory of accommodation one major cause of the development of presbyopia is the increasing sclerosis of the crystalline lens. One ...
Investigations of the ultrafast laser induced melt dynamics by means of transient quantitative phase microscopy (TQPM)	I. Mingareev, A. Horn	Proc. SPIE Vol. 7005, p. 70050P	Modifications of bulk Aluminum irradiated well above ablation threshold ($F < 300 \text{ J}\cdot\text{cm}^{-2}$) have been investigated in situ by means of shadowgraphy and transient ...
Investigations on melting and welding of glass by ultra-short laser radiation	A. Horn, I. Mingareev, A. Werth	J. Laser Micro/Nanoeng. Vol. 3, No. 2, pp.171-175	The interaction of laser radiation with pulse duration at 80 fs and wavelength $\lambda = 800 \text{ nm}$ with BK7 glass is detected by pump & probe techniques. No melt ejection dynamics ...
Investigations on ultrafast welding of glass-glass and glass-silicon	A. Horn, I. Mingareev, A. Werth, M. Kachel, U. Brenk	Appl. Phys. A Vol. 93, No. 1, pp. 171-175	Using ultrafast laser radiation glass substrates are welded with glass and silicon plates. The pump beam is focused by a microscope objective with large NA = 0.4 ...
Low-loss waveguides fabricated in BK7 glass by high repetition rate femtosecond fiber laser	S.M. Eaton, M.L. Ng, J. Bonse, A. Mermillod-Blondin, H. Zhang, A. Rosenfeld, P.R. Herman	Appl. Opt. Vol. 47, No. 12, pp. 2098-2102	For the first time femtosecond-laser writing has inscribed low-loss optical waveguides in Schott BK7 glass, a commercially important type of borosilicate widely used ...
Manufacturing of periodical nanostructures by fs-laser direct writing	J. Gottmann, D. Wortmann, R. Wagner	Proc. SPIE Vol. 1022, p. 702202	Sub wavelength ripples (spacing $< \lambda/4$) perpendicular to the polarisation of the laser radiation are obtained by scanning a tightly focused beam ($\sim 1 \mu\text{m}$) of femtosecond laser ...
Micro- and nanostructures inside sapphire by fs-laser irradiation and selective etching	D. Wortmann, J. Gottmann, N. Brandt, H. Horn-Solle	Opt. Exp. Vol. 16, No. 3, pp. 1517-1522	The fabrication of microchannels and self-assembled nanostructures in the volume of sapphire was performed by femtosecond laser irradiation followed by chemical ...
Nano- and microstructuring of SiO ₂ and Sapphire with fs-laser induced selective etching	M. Horstmann-Jungemann, J. Gottmann, D. Wortmann	JLMN Vol. 4, No. 2, pp. 135-140	Sub wavelength ripples perpendicular to the polarisation of the laser radiation are obtained by scanning a tightly focused beam ($\sim 1 \mu\text{m}$) of femtosecond laser radiation ...
Origin of the fast relaxation component of water and heavy water revealed by terahertz time-domain attenuated total reflection spectroscopy	H. Yada, M. Nagain, K. Tanaka	Chem. Phys. Lett. Vol. 464, No. 4-6, pp. 166-170	We determined the dielectric constants of water and heavy water (0.2 – 3.5 THz) from 270 to 362 K, and decomposed them into four components: slow relaxation, fast ...

2008 (Continued)

Raman gain from waveguides inscribed in KGd(WO ₄) ₂ by high repetition rate femtosecond laser	S.M. Eaton, C.A. Merchant, R. Iyer, A.J. Zilkie, A.S. Helmy, J.S. Aitchison, P.R. Herman, D. Kraemer, R.J.D. Miller, C. Hnatovsky, R.S. Taylor	Appl. Phys. Lett. Vol. 92, p. 081105	We report the formation of waveguides in Raman-active KGd(WO ₄) ₂ with a focused, high repetition rate femtosecond laser. Parallel guiding regions, formed ...
Self-assembled sub-wavelength structures and form birefringence created by femtosecond laser writing in glass: properties and applications	P.G. Kazansky, Y. Shimotsuma	J. Ceram. Soc. Jpn. Vol. 116, No. 10, pp. 1052-1062	Properties and applications of self-assembled sub-wavelength structures and related form birefringence produced by femtosecond laser writing in Silica glass ...
Self-grown fiber fabrication by two-photon photopolymerization	H. Hidai, D.J. Hwang, C.P. Grigoropoulos	Appl. Phys. A Vol. 93, No. 2, pp. 443-445	New fiber growth mechanism in a photocurable resin by ultrafast laser illumination. A high rep rate (>1 MHz) ultrafast laser beam at wavelength λ 523 nm was ...
Signal restoration from atmospheric degradation in Terahertz spectroscopy	S.G. Kong, D.H. Wu	J. Appl. Phys. Vol. 103, p. 113105	This paper presents a method of restoring signals in terahertz spectroscopy by removing the distortion from the observed terahertz signals. The distortion is generated ...
Single cell detection using a glass-based optofluidic device fabricated by femtosecond laser pulses	M. Kim, D.J. Hwang, H. Jeon, K. Hiromatsu, C.P. Grigoropoulos	Lab Chip Vol. 9, pp. 311-318	Fabrication of integrated three-dimensional microchannel and optical waveguide structures inside fused Silica for interrogation and processing of single cells. ...
Structural modifications in Er-Yb doped Phosphate glass induced by femtosecond laser waveguide writing	L.B. Fletcher, J.J. Witcher, W.J. Reichman, J. Bovatsek, A. Arai, D.M. Krol	Proc. SPIE Vol. 6881, p. 688111	We have systematically studied femtosecond-laser fabrication of optical waveguides in an Er-Yb doped phosphate glass. Waveguides were written using the ...
Three-dimensional biomimetic microchannel network by laser direct writing	D.H. Kam, J. Mazumder	J. Laser Appl. Vol. 20, No. 3, pp. 185-192	Application of laser direct writing to the fabrication of microchannel networks for tissue engineering was presented. A Q-switched Nd:YAG laser with ...
Time-resolved studies of particle effects in laser ablation inductively coupled plasma-mass spectrometry	D.C. Perdian, S.J. Bajic, D.P. Baldwin, R.S. Houk	J. Anal. At. Spectrom. Vol. 23, No. 3, pp. 325-335	Transient signal responses for ablated samples as a function of particle size and laser parameters are characterized. Data are acquired with time resolution ...
Transition from thermal diffusion to heat accumulation in high repetition rate femtosecond laser writing of buried optical waveguides	S.M. Eaton, H. Zhang, M.L. Ng, J. Li, W-J. Chen, S. Ho, P.R. Herman	Opt. Exp. Vol. 16, No. 13, pp. 9443-9458	A variable (0.2 to 5 MHz) repetition rate femtosecond laser was applied to delineate the role of thermal diffusion and heat accumulation effects in forming low-loss optical ...

2009

Active balance in free-space electro-optic detection of THz waves	B. Schulkin, X.-C. Zhang	J. Lightwave Tech. Vol. 27, No. 17, pp. 3773-3776	A method for increasing the stability of Terahertz (THz) time-domain spectrometers utilizing electro-optic balanced detection is presented in this paper. The stability of ...
All-fiber CARS microscopy of live cells	A.F. Pegoraro, A. Ridsdale, D.J. Moffatt, J.P. Pezacki, B.K. Thomas, L. Fu, L. Dong, M.E. Fermann, A. Stolow	Opt. Exp. Vol. 17, No. 23, pp. 20700-20706	Using an all-fiber laser system consisting of a femtosecond Er/Yb fiber oscillator as the pump and an ultra-highly nonlinear fiber for Stokes generation, we demonstrate ...
Broadband and high power THz pulse generation beyond excitation bandwidth limitation via $\chi^{(2)}$ cascaded processes in LiNbO ₃	M. Nagai, M. Jewariya, Y. Ichikawa, H. Ohtake, T. Sugiura, Y. Uehara, K. Tanaka	Opt. Exp. Vol. 17, No. 14, pp. 11543-11549	We proposed a novel THz generation technique beyond the limitation of the input optical pulse width, based on phase modulation via cascaded $\chi^{(2)}$ process. When ...
Burst mode femtosecond pulsed laser deposition for control of thin film morphology and material ablation	M. Murakami, B. Liu, Z. Hu, Z. Liu, Y. Uehara, Y. Che	Appl. Phys. Exp. Vol. 2, p. 042501	We introduce an alternative approach of pulsed laser deposition (PLD) using groups of closely time spaced (20 ns) femtosecond laser pulses, namely burst-mode ...
Changes to the network structure of Er-Yb doped Phosphate glass induced by femtosecond laser pulses	L.B. Fletcher, J.J. Witcher, W.B. Reichman, A. Arai, J. Bovatsek, D.M. Krol	J. Appl. Phys. Vol. 106, p. 083107	Changes to the glass network structure after modification with tightly focused 1043 nm, 400 fs laser pulses have been studied in Er-Yb doped Phosphate glass using ...

2009 (Continued)

Chirped bragg grating waveguides directly written inside fused Silica glass with an externally modulated ultrashort fiber laser	H. Zhang, P.R. Herman	IEEE Phot. Tech. Lett. Vol. 21, No. 5, pp. 277 - 279	A modulated fiber laser provided burst-trains of femtosecond pulses to directly write linearly chirped Bragg grating waveguides inside bulk fused Silica glass in a ...
Effect of time-gating and polarization-discrimination of propagating light in turbid media during Angular Domain Imaging (ADI)	F. Basefi, E. Ng, B. Kaminsky, G.H. Chapman, J.J.L. Carson	Prog. Biomed. Opt. Imag. Vol. 10, No. 22, pp. 718217	Angular Domain Imaging (ADI) employs an angular filter array to accept photons within a small acceptance angle along the axis of an aligned laser light source and ...
Experimental characterization of a telecommunications-band quantum controlled not gate	M. Patel, J.B. Altepeter, M.A. Hall, M. Medic, P. Kumar	IEEE J. Select. Top. Quant. Elect. Vol. 15, No. 6, pp. 1685-1693	The quantum controlled-not gate is an example of the maximally entangling gate, which is a broad class of operations that are necessary for scalable linear ...
Fabrication of sub-wavelength surface ripples and in-volume nanostructures by fs-laser induced selective etching	J. Gottmann, D. Wortmann, M. Horstmann-Jungemann	Appl. Surf. Sci. Vol. 255, No. 10, pp. 5641-5646	Continuous sub-wavelength ripples on the surface of sapphire and fused silica have been produced not only in one dimension but also in two dimensions by scanning ...
Femtosecond laser direct written diffractive optical elements and their integration in oxide glass	J. Choi, M. Richardson	Proc. SPIE Vol. 7203, p. 7203G	Femtosecond laser direct writing was applied to fabricate 3D diffractive optical elements in oxide glass. Here we report our initial results. We describe the consequences ...
Femtosecond laser treatment enhances DNA transfection efficiency in vivo	S.-W.D. Tsen, C.-Y. Wu, A. Meneshian, S.I. Pai, C.-F. Hung, T.-C. Wu	J. Biomed. Sci. Vol. 16, No. 36	Gene therapy with plasmid DNA is emerging as a promising strategy for the treatment of many diseases. One of the major obstacles is the poor transfection efficiency ...
Femtosecond laser written optofluidic sensor: Bragg grating waveguide evanescent probing of microfluidic channel	V. Maselli, J.R. Grenier, S. Ho, P.R. Herman	Opt. Exp. Vol. 17, No. 14, pp. 11719-11729	Microfluidic channels and Bragg Grating Waveguides (BGWs) were simultaneously fabricated inside fused silica glass by means of femtosecond laser exposure ...
High speed and high precision fs-laser writing using a scanner with large numerical aperture	J. Gottmann, M. Horstmann-Jungemann, M. Hermans, D. Beckmann	JLMN Vol. 4, No. 3, pp. 192-196	Currently available high speed scanning systems based on galvo mirrors are equipped with objectives with small numerical apertures (NA < 0.2) which are not sufficient ...
High speed high precision ablation from ms to fs	R. Poprawe, A. Gillner, D. Hoffmann, J. Gottmann, W. Wawers, W. Schulz	Proc. SPIE Vol. 7005, p. 700502	In recent years new generations of precision lasers have been demonstrated and are increasingly available on an industrial level. For example high beam quality and ...
Hydration structures of 2-butoxyethanol monomer and micelle in solution	T. Arikawa, M. Nagai, K. Tanaka	Chem. Phys. Lett. Vol. 477, No. 1-3, pp. 95-101	We determined the hydration numbers of 2-butoxyethanol (2BE) molecules in the monomeric and the micellar form using Terahertz time-domain attenuated total reflection ...
<i>In vivo</i> molecular evaluation of guinea pig skin incisions healing after surgical suture and laser tissue welding using Raman spectroscopy	A. Alimova, R. Chakraverty, R. Muthukattil, S. Elder, A. Katz, V. Sriramoju, S. Lipper, R.R. Alfano	J Photochem. & Photobiol. B Vol. 96, No. 3, pp. 178-18	The healing process in guinea pig skin following surgical incisions was evaluated at the molecular level, in vivo, by the use of Raman spectroscopy. After the incisions were ...
Interference microscopy of femtosecond laser written waveguides in phosphate glass	D. Esser, D. Mahlmann, D. Wortmann, J. Gottmann	Appl. Phys. B Vol 96, No. 2-3, pp. 453-457	By focusing fs-laser radiation in the volume of a transparent material the refractive index can be changed locally, leading to 3-dimensional waveguiding structures. ...
In-volume waveguides by fs-laser direct writing in rare-earth-doped Fluoride glass and Phosphate glass	D. Esser, D. Wortmann, J. Gottmann	Proc. SPIE Vol. 7205, p. 720510	Refractive index modifications are fabricated in the volume of rare-earth-doped glass materials namely Er- and Pr-doped ZBLAN (a Fluoride glass consisting of ZrF ₄ , ...
Micromachining and surface processing of the super-hard nano-polycrystalline diamond by three types of pulsed lasers	T. Okuchi, H. Ohfuji, S. Odake, H. Kagi, S. Nagatomo, M. Sugata, H. Sumiya	Appl. Phys. A Vol. 96, No. 4, pp. 833-842	Laser beam micromachining was applied to super-hard nano-polycrystalline diamond (NPD) synthesized by the direct conversion of graphite at high pressure and...

2009 (Continued)

Optical coherence microscopy for nondestructive 3D imaging of femtosecond laser written structures	J. Choi, K.-S. Lee, S. Murali, T. Anderson, J.P. Rolland, M.C. Richardson	Proc. SPIE Vol. 7203, p. 720317	Optical coherence microscopy (OCM) imaging of femtosecond laser direct written buried structures created within transparent media. Volumetric structures of ...
Quasi-super-continuum generation using ultrahigh-speed wavelength-tunable soliton pulses	K. Sumimura, T. Ohta, N. Nishizawa	Opt. Lett. Vol. 33, No. 24, pp. 2892-2894	A quasi-super-continuum (quasi-SC) source is demonstrated as a new broadband light source for the first time to our knowledge using electronically controlled ...
Random error estimation in refractive index measured with the terahertz time domain spectroscopy	S.R. Tripathi, M. Aoki, K. Mochizuki, T. Asahi, I. Kosako, N. Hiromoto	IEICE Elect. Exp. Vol. 6, No. 23, pp. 1690-1696	This study proposes a practical method to estimate the random error in real part of refractive index measured with terahertz time domain spectroscopy (THz-TDS) for ...
Self-standing aligned fiber scaffold fabrication by two photon photopolymerization	H. Hidai, H. Jeon, D.J. Hwang, C.P. Grigoropoulos	Biomed. Microdev. Vol. 11, pp. 643-352	Development of materials and fabrication techniques lead the growth of three-dimensional cell culture matrices in biomedical engineering. In this work, we present a ...
Spectral loss characterization of femtosecond laser written waveguides in glass with application to demultiplexing of 1300 and 1550 nm wavelengths	S.M. Eaton, W.-J. Chen, H. Zhang, R. Iyer, J. Li, M.L. Ng, S. Ho, J.S. Aitchison, P.R. Herman	J. Lightwave Tech. Vol. 27, No. 9, pp. 1079-1085	Femtosecond laser written waveguides in glass were characterized across the full telecom spectrum to gain insight into waveguide loss mechanisms, and to aid ...
Switching of 800 nm femtosecond laser pulses using a compact PMN-PT modulator	P. Adany, E.S. Price, C.K. Johnson, R. Zhang, R. Hui	Rev. Sci. Instrum. Vol. 80, No. 3, pp. 033107	A voltage-controlled birefringent cell based on ceramic PMN-PT material is used to enable fast intensity ...
Terahertz reflection spectroscopy of Debye relaxation in polar liquids	U. Moller, D.G. Cooke, K. Tanaka, P.U. Jepsen	JOSA B Vol. 25, No. 9, pp. A113-A125	Real-time Fourier-transformation-based ranging lidar using a mode-locked femtosecond fiber laser is demonstrated. The object signal and the reference signal are guided ...
The intermolecular stretching vibration mode in water isotopes investigated with broadband THz time-domain spectroscopy	H. Yada, M. Nagai, K. Tanaka	Chem. Phys. Lett. Vol. 473, No. 4-6, pp. 279-283	We determined the complex dielectric constants of the liquid water isotopes, H ₂ O, D ₂ O, and H ₂ ¹⁸ O at 296 K from 0.2 to 7 THz by terahertz time-domain attenuated ...
Three-dimensional opto-fluidic devices fabricated by ultrashort laser pulses for high throughput single cell detection and processing	D.J. Hwang, M. Kim, K. Hiromatsu, J. Jeon, C.P. Grigoropoulos	Appl. Phys. A Vol. 96, pp. 385-390	Three-dimensional flow-through microchannels were fabricated inside bulk fused Silica glass via ultrashort pulsed laser direct writing. The device fabrication ...
Ultrashort pulse laser processing of transparent materials	F. Yoshino, H. Zhang, A. Arai	JLMN Vol. 4, No. 3, pp. 212-217	Ultrashort pulse lasers can generate extremely high peak power with a modest average power. For example, a 1-W average power laser can produce pulses with a ...
Visualization of femtosecond laser pulse-induced microincisions inside crystalline lens tissue	O. Stachs, S. Schumacher, M. Hovakimyan, M. Fromm, A. Heisterkamp, H. Lubatschowski, R. Guthoff	J Cataract. Refract. Surg. Vol. 35, No. 11, pp. 1979-1983	Lenses removed from porcine eyes were modified ex vivo by femtosecond laser pulses (wavelength 1040 nm, pulse duration 306 femtoseconds, pulse energy 1.0 to 2.5 μJ ...

2010

3D-microstructuring of Sapphire using fs-laser irradiation and selective etching	M. Hoerstmann-Jungemann, J. Gottmann, M. Keggenhoff	JLMN Vol. 5, No. 2, pp. 145-149	We demonstrate a technique called "In volume Selective Laser Etching" (ISLE) for fs laser micro structuring of Sapphire with subsequent wet etching in HF acid ...
Angular domain transillumination imaging optimization with an ultrafast gated camera	F. Vasefi, M. Najiminaini, E. Ng, B. Kaminska, G.H. Chapman, J.J.L. Carson	J. Biomed. Opt. Vol. 15, No. 6, p. 061710	By employing high-aspect-ratio parallel microchannels as an angular filter, quasiballistic photons sensitive to internal structures in a turbid medium can be captured. ...
Decoding coherent information in femtosecond shaped laser pulses	I. Bhattacharyya, A. Dutta, S. Ashtekar, S.K. Maurya, D. Goswami	Curr. Sci. Vol. 99, No. 4, pp. 476-484	We report here an experimental demonstration of a pulse decoding technique from spectral analysis of femtosecond pulses. This technique is based on a single-step Fourier ...

2010 (Continued)

Development of a time-resolved white-light interference microscope for optical phase measurements during fs-laser material processing	A. Horn, D. Wortmann, A. Brand, I. Mingareev	Appl. Phys. A Vol. 101, No. 2, pp. 231-235	A modified Mach–Zehnder interferometer set-up combined with microscope objectives has been developed for the measurement of phase changes in the processed ...
Electrical field distribution in THz Si-GaAs photoconductive antennas	S. Wei, Z. Zhen-Zhen, H. Lei	Chin. Phys. Lett. Vol. 27, No. 8, p. 087203	Terahertz signals emitted from three photoconductive antennae based on semi-insulating GaAs and with different gap sizes are tested. These signals represent that the ...
Epitaxial Zn _{1-x} Mg _x O films grown on (1 1 1) Si by pulsed laser deposition	X.H. Pan, W. Guo, Z.Z. Ye, B. Liu, Y. Che, C.T. Nelson, Y. Zhang, W. Tian, D.G. Schlom, X.Q. Pan	Chem. Phys. Lett. Vol. 485, No. 4-6, pp. 363-366	Zn _{1-x} Mg _x O thin films are epitaxially grown on (1 1 1) Si substrates using intervening epitaxial Lu ₂ O ₃ buffer layers by pulsed laser deposition. Lu ₂ O ₃ buffer layers by ...
Experimental confirmation of miniature spiral plasmonic lens as a circular polarization analyzer	W. Chen, D.C. Abeysinghe, R.L. Nelson, Q. Zhan	Nano Lett. Vol. 10, No. 6, pp. 2075–2079	A spiral plasmonic lens can focus circular polarization of a given handedness while simultaneously defocus the circular polarization of the opposite chirality, which ...
Fabrication of arbitrary polymer patterns for cell study by two-photon polymerization process	H. Jeon, H. Hidai, D.J. Hwang, C.P. Grigoropoulos	J. Biomed. Mater. Res. A, Vol. 93, No. 1, pp. 56-66	Topographically patterned surfaces are known to be powerful tools for influencing cellular functions. Here we demonstrate a method for fabricating high aspect ...
Femtosecond laser written embedded diffractive optical elements and their applications	J. Choi, M. Ramme, T. Anderson, M.C. Richardson	Proc. SPIE Vol. 7589, p. 75891A	Femtosecond laser direct writing (FLDW) has been widely employed to create volumetric structures in transparent materials that are applicable as various ...
Femtosecond lentotomy: generating gliding planes inside the crystalline lens to regain accommodation ability	H. Lubatschowski, S. Schumacher, M. Fromm, A. Wegener, H. Hoffmann, U. Oberheide, G. Gerten	J. Biophot. Vol. 3, No. 5-6, pp. 265 - 268	Based on Helmholtz Theory for accommodation the increasing sclerosis of lens nucleus and cortex is the main cause for the developments of presbyopia. Existing ...
High-order nonlinearity of Silica-Gold nanoshells in chloroform at 1560 nm	E.L. Falcao-Filho, R. Barbosa-Silva, R.G. Sobral-Filho, A.M. Brito-Silva, A. Galmbeck, C.B. de Araujo	Opt. Exp. Vol. 18, No. 21, pp. 21636-21644	The nonlinear response of Silica - Gold nanoshells (SGNs) in chloroform was studied using laser pulses of 65 fs at 1560 nm. The experiments were performed using the ...
<i>In situ</i> measurement of combustion gas using Terahertz time domain spectroscopy setup for gas phase spectroscopy and measurement of solid sample	T. Uno, H. Tabata	Jpn. J. Appl. Phys. Vol. 49, p. 04DL17	The transmission properties of gas phase samples heavily contaminated with aerosols, particles, and water vapor generated by combustible materials as well as the ...
<i>In vivo</i> non-linear optical (NLO) imaging in live rabbit eyes using the Heidelberg two-photon laser ophthalmoscope	M. Hao, K. Flynn, C. Nien-Shy, B.E. Jester, M. Winkler, D.J. Brown, O. La Schiazza, J. Bille, J.V. Jester	Exper. Eye Res. Vol. 91, No. 2, pp. 308-314	Imaging of non-linear optical (NLO) signals generated from the eye using ultrafast pulsed lasers has been limited to the study of ex vivo tissues because of the use of ...
Integrated optical circuits in fiber cladding by tightly focused femtosecond laser writing	V. Maselli, P.R. Herman	Proc. SPIE Vol. 7585, p. 75850F	Femtosecond laser direct writing in glass materials represents a simple single-step approach to generate 3-D optical circuits that cannot be constructed with traditional ...
Nano-aquarium fabrication with cut-off filter for mechanism study of Phormidium assemblage	Y. Hanada, K. Sugioka, I. Ishikawa, H. Kawano, A. Miyawaki, K. Midorikawa	Proc. SPIE Vol. 7584, p. 75840Q	We demonstrate fabrication of microfluidic chips integrated with different functional elements such as optical filters and optical waveguide for mechanism of gliding movement. ...
Nanoaquariums fabricated by femtosecond laser for exploration of dynamics and functions of microorganisms	K. Sugioka, Y. Hanada, H. Kawano, I.S. Ishikawa, A. Miyawaki, K. Midorikawa	AIP Conf. Proc. Vol. 1278, pp. 426-437	We demonstrate to fabricate microfluidic chips integrated with some functional elements such as optical attenuators and optical waveguides by femtosecond (fs) laser direct ...
Practical method to estimate the standard deviation in absorption coefficients measured with THz time-domain spectroscopy	S.R. Tripathi, M. Aoki, K. Mochizuki, I. Hosako, T. Asahi, N. Hiromoto	Opt. Comm. Vol. 283, No. 12, pp. 2488-2491	A model of standard deviation in the intensity spectrum of electric field observed with the terahertz time-domain spectroscopy (THz-TDS) is proposed to estimate the ...

2010 (Continued)

Progress on the fabrication of on-chip, integrated chalcogenide glass (CHG)-based sensors	K. Richardson, L. Petit, N. Carlie, B. Zdyrko, I Luzinov, J. Hu, A. Agarwal, L. Kimerling, T. Anderson, M. Richardson	J. Nonlinear Opt. Phys. Mat. Vol. 19, No. 1, pp. 25-99	In this paper, we review ongoing progress in the development of novel on-chip, low loss planar molecular sensors that address the emerging need in the field of ...
The effect of micronscale anisotropic cross patterns on fibroblast migration	H. Jeon, H. Hidai, D.J. Hwang, K.E. Healy, C.P. Grigoropoulos	Biomat. Vol. 31, pp. 4286–4295	Cell movement on adhesive surfaces is a complicated process based on myriad cell–surface interactions. Although both micron and nanoscale surface topography ...
Two-photon microscopy-guided femtosecond-laser photoablation of avian cardiogenesis: noninvasive creation of localized heart defects	H.C. Yalcin, A. Shakhar, N. Nishimura, A.A. Rane, C.B. Schaffer, J.T. Butcher	Am. J. Physiol. Heart Circ. Physiol. Vol. 299, pp. H1728-H1735	Embryonic heart formation is driven by complex feedback between genetic and hemodynamic stimuli. Clinical congenital heart defects (CHD), however, often ...
Ultrafast laser inscription of near-infrared waveguides in polycrystalline ZnSe	J.R. Macdonald, R.R. Thomson, S.J. Beecher, N.D. Psaila, H.T. Bookey, A.K. Kar	Opt. Lett. Vol. 35, No. 23, pp. 4036-4038	We report the successful fabrication of a low-loss near-IR waveguide in polycrystalline ZnSe using ultrafast laser inscription. The waveguide, which was inscribed using ...

2011

3D microfluidic chips with integrated functional microelements fabricated by a femtosecond laser for studying the gliding mechanism of Cyanobacteria	Y. Hanada, K. Sugioka, I. Shihira-Ishikawa, H. Kawano, A. Miyawaki, K. Midorikawa	Lab Chip Vol. 11, No. 12, pp. 2109-2115	Phormidium, a genus of filamentous cyanobacteria, forms endosymbiotic associations with seedling roots that accelerate the growth of the vegetable seedlings. ...
All-optical switching on photonic entanglement	M.A. Hall, J.B. Altepeter, P. Kumar	New J. Phys. Vol. 13, p. 105004	Future quantum optical networks will require the ability to route entangled photons at high speeds, with minimal ...
Anticoagulation with the oral direct thrombin inhibitor Dabigatran does not enlarge hematoma volume in experimental intracerebral hemorrhage	A. Lauer, F.A. Cianchetti, E.M. Van Cott, F. Schlunk, E. Schulz, W. Preilschifter, H. Steinmetz, C.B. Schaffer, E.H. Lo, C. Foerch	Circulation Vol. 124, pp. 1654-1662	Background—The direct thrombin inhibitor dabigatran etexilate (DE) may constitute a future replacement of vitamin K antagonists for long-term anticoagulation. ...
Characterization of channel waveguides in Pr:YLiF ₄ crystals fabricated by direct femtosecond laser writing	D. Beckmann, D. Esser, J. Gottmann	Appl. Phys. B Vol. 104, No. 3, pp. 619-624	Single tracks and pairs of tracks are written in the volume of Pr-doped LiYF ₄ crystals using tightly focused femtosecond laser radiation ($\lambda = 1045$ nm, $\tau = 400$ -500 ...
Cortical microhemorrhages cause local inflammation but do not trigger widespread dendrite degeneration	N.L. Rosidi, J. Zhou, S. Pattanaik, P. Wang, W. Jin, M. Brophy, W.L. Olbricht, N. Nishimura, C.B. Schaffer	Plos ONE Vol. 6, No. 10, p. e26612	Microhemorrhages are common in the aging brain, and their incidence is correlated with increased risk of neurodegenerative disease. Past work has shown that ..
Direct laser writing of near-IR step-index buried channel waveguides in rare earth doped YAG	A. Rodenas, A. Benayas, J.R. Macdonald, J. Zhang, D.Y. Tang, D. Jaque, A.K. Kar	Opt. Lett. Vol. 36, No. 17, pp. 3395-3397	A new (to our knowledge) ultrashort laser pulse irradiation regime that allows us to directly modify and increase the refractive index of rare earth doped YAG polycrystalline ...
Efficient microwelding of glass substrates by ultrafast laser irradiation using a double-pulse train	K. Sugioka, M. Iida, H. Takai, K. Micorikawa	Opt. Lett. Vol. 36, No. 14, pp. 2734-2736	Efficient microwelding of glass substrates by irradiation by a double-pulse train of ultrafast laser pulses is demonstrated. Temporal beam shaping techniques such ...
Fabrication of mitigation pits for improving laser damage resistance in dielectric mirrors by femtosecond laser machining	J.E. Wolfe, S.R. Qiu, C.J. Stolz	Appl. Opt. Vol. 50, No. 9, pp. C457-C462	Femtosecond laser machining is used to create mitigation pits to stabilize nanosecond laser-induced damage in multilayer dielectric mirror coatings on BK7 substrates. ...
Femtosecond laser machining of multi-depth microchannel networks onto silicon	D.H. Kam, L. Shah, J. Mazumder	Micromech. Microeng. Vol. 21, p. 045027	Direct writing of multi-depth microchannel branching networks into a Silicon wafer with femtosecond pulses at 200 kHz is reported. The Silicon wafer with the ...
Fiber laser based two-photon FRET measurement of Calmodulin and mCherry-E0 GFP proteins	P. Adany, C.K. Johnson, R. Hui	Microsc. Res. Tech. Vol. 75, No. 6, pp. 837-843	The speed and accuracy of Förster resonance energy transfer (FRET) measurements can be improved by rapidly alternating excitation wavelengths between the donor ...

2011 (Continued)

High effective terahertz radiation from semi-insulating-GaAs photoconductive antennas with Ohmic contact electrodes	W. Shi, L. Hou, X. Wang	J. Appl. Phys. Vol. 110, p. 023111	Terahertz (THz) radiation efficiency of a photoconductive antenna with Schottky contact electrodes is low because the electrical field is limited to a narrow region close to ...
High refractive index contrast in fused Silica waveguides by tightly focused, high-repetition rate femtosecond laser	S.M. Eaton, M.L. Ng, R. Osellame, P.R. Herman	J. Non-crystal. Solids Vol. 357, No. 11-13, pp. 2387-2391	A new domain of optical waveguide writing with record high refractive index contrast (0.022) is reported in fused Silica by strong focusing of a 522 nm wavelength, 500 kHz ...
In vivo imaging of Myelin in the vertebrate central nervous system using third harmonic generation microscopy	M.J. Farrar, F.W. Wise, J.R. Fetcho, C.B. Schaffer	Biophys. J. Vol. 100, pp. 1362-1371	Loss of myelin in the central nervous system (CNS) leads to debilitating neurological deficits. High-resolution optical imaging of myelin in the CNS of animal models ...
Intense Terahertz radiation from mm-gap GaAs photoconductive antenna	L. Hou, W. Shi	J. Phys: Conf. Ser. Vol. 276, p. 012208	The Terahertz pulse energy from photoconductive antenna is mainly derived from that stored in the static bias field. To obtain high intense THz radiation, the distribution of ...
Measurement of contractile forces generated by individual fibroblasts on self-standing fiber scaffolds	H. Jeon, E. Kim, C.P. Grigoropoulos	Biomed. Microdev. Vol. 13, pp. 107-115	Contractility of cells in wound site is important to understand pathological wound healing and develop therapeutic strategies. In particular, contractile force ...
Polarization dependence of two-photon absorption coefficient and nonlinear susceptibility tensor in InP	T. Matsusue, H. Bando, S. Fujita	Phys. stat. solid. Vol. 8, No. 2, pp. 387-389	Two-photon absorption (TPA) effect in (0 0 1) InP is investigated using fs laser. Its dependences on wavelength and polarization are clarified by single and double beam ...
Probing intermolecular interaction through thermal-lens spectroscopy	I. Bhattacharyya, K. Pardeep, G. Debabrata	J. Phys. Chem. B Vol. 115, No. 2, pp. 262-268	Binary liquid mixtures are studied using femtosecond pump-probe thermal-lens (TL) spectroscopy. Changes in the measured TL signals as a function of relative ...
Random error in intensity spectrum measured with THz-TDS - no relation to the intensity fluctuation of fs-laser	M. Takeda, S.R. Tripathi, M. Aoki, N. Hiromoto	Adv. Mat. Res. Vol. 222, pp. 213-216	We explored sources of random errors in intensity spectra measured with THz-TDS. Influences of detection accuracies, optical-delay scanning, atmospheric ...
Reproducibility of LASIK flap thickness using the Zeiss femtosecond laser measured postoperatively by optical coherence tomography	W.-K. Ju, J.-H. Lee, T.-Y. Chung, E.-S. Chung	J. Refract. Surg. Vol. 27, No. 2, pp. 106-110	Purpose: To evaluate LASIK flap reproducibility and uniformity created with a femtosecond laser using anterior segment optical coherence tomography (OCT). ...
Single stage ultrafast laser inscription of a side-polished fiber-like waveguide sensor	S. Beecher, R. Thomson, B. Pal, A.K. Kar	IEEE Sens. J. Vol. 11, No. 12	Ultrafast laser inscription (ULI) has been used to fabricate an 18 mm long sub-surface optical waveguide in fused silica. The waveguide started and terminated ...
Terahertz sources	P. Shumyatsky, R.R. Alfano	J. Biomed. Opt. Vol. 16, p. 022001	we present an overview and history of terahertz sources for readers of the biomedical and optical community for applications in physics, biology, chemistry, medicine, ...
Thermal stability of GaAs photoconductive terahertz antenna	W.L. Fia, L. Hou, S.G. Chen, X.J. Hu, S.Q. Wang, W. Shi	Microwave Opt. Tech. Lett. Vol. 53, pp. 2393-2395	We tested the THz intensity, current, and temperature of two kinds of antennas. In the experiment, THz intensity of an antenna went down with time. The instability is ...
Three-dimensional direct femtosecond laser writing of second-order nonlinearities in glass	J. Choi, M. Bellec, A. Royon, K. Bourhis, G. Papon, T. Cardinal, L. Canioni, M. Richardson	Opt. Lett. Vol. 37, No. 6, pp. 1029-1031	We demonstrate that direct femtosecond laser writing in Silver-containing Zinc and Gallium Phosphate glass enables generating of 3D optical second-order nonlinear ...
Time-domain near-infrared spectroscopy using a wavelength-tunable narrow-linewidth source by spectral comparison of ultrashort soliton pulses	N. Nishizawa, K. Takahashi	Opt. Lett. Vol. 36, No. 19, pp. 3780-3782	Time-domain absorption spectroscopy was demonstrated using a wideband, rapid wavelength-tunable, narrow-linewidth source based on an Er-doped ultrashort pulse ...

2011 (Continued)

Tunable excitation source for coherent Raman spectroscopy based on a single fiber laser	P. Adany, D.C. Arnett, C.K. Johnson, R. Hui	Appl. Phys. Lett. Vol. 99, p. 181112	We demonstrate a wavelength tunable optical excitation source for coherent Raman scattering (CRS) spectroscopy based on a single femtosecond fiber laser. Electrically ...
Ultrafast laser inscription of an integrated photonics lantern	R.R. Thomson, T.A. Birks, S.G. Leon-Saval, A.K. Kar, J. Bland-Hawthorn	Opt. Exp. Vol. 19, No. 6, pp. 5698-5705	We used ultrafast laser inscription to fabricate three-dimensional integrated optical transitions that efficiently couple light from a multimode waveguide to a ...
Ultrafast laser microwelding for transparent and heterogeneous materials	K. Itoh, T. Tamaki	Proc. SPIE Vol. 6881, p. 68810V	When ultrafast laser pulses are focused inside the interface between a couple of transparent materials, the optical intensity in the focal area can usually become high ...
Ultrafast switching of photonic entanglement	M.A. Hall, J.B. Altepeter, P. Kumar	Phys.Rev. Lett. Vol. 106, p. 053901	To deploy and operate a quantum network which utilizes existing telecommunications infrastructure, it is necessary to be able to route entangled photons at high speeds, ...

2012

3D Bragg grating waveguide devices	H. Zhang, P.R. Herman	Topics Appl. Phys. Vol. 123, pp. 227-264	Over the past decade, ultrashort pulse laser processing has opened a large suite of photonic devices that can be formed inside bulk optical glasses by direct writing. Such ...
A 3D mammalian cell separator biochip	D. Choudhury, W.T. Ramsay, R. Kis, N.A. Willoughby, L. Paterson, A.K. Kar	Lab Chip Vol. 12, No. 5, pp. 948-953	The dissimilar cytoskeletal architecture in diverse cell types induces a difference in their deformability that presents a viable approach to separate cells in a non-invasive ...
Characterization of individual microneedles formed on alloy surfaces by femtosecond laser ablation	S. Bhattacharya, D.H. Kam, L. Song, J. Mazumder	Metallurg. Mat. Trans. A Vol. 43, No. 8, pp. 2574-2580	Cross-sectional microstructural analyses of micron/nano-sized structures (termed microneedles) formed by low and high fluence pulse laser ablation of AISI 4340 steel, ...
Chronic <i>in vivo</i> imaging in the mouse spinal cord using an implanted chamber	M.J. Farrer, I.M. Bernstein, D.H. Schlafer, T.A. Cleland, J.R. Fetcho, C.B. Schaffer	Nature Methods Vol. 9, pp. 297-302	Understanding and treatment of spinal cord pathology is limited in part by a lack of time-lapse <i>in vivo</i> imaging strategies at the cellular level. We developed a ...
Compact, highly efficient Ytterbium doped Bismuthate glass waveguide laser	R. Mary, S.J. Beecher, G. Brown, R.R. Thomson, D. Jaque, S. Ohara, A.K. Kar	Opt. Lett. Vol. 37, No. 10, pp. 1691-1693	Laser slope efficiencies close to the quantum defect limit and in excess of 78% have been obtained from an ultrafast laser inscribed buried channel waveguide fabricated in a ...
Control of the wetting properties of AISI 316L stainless steel surface by femtosecond laser-induced surface modification	D.H. Kam, S. Bhattacharya, J. Mazumder	J. Micromech. Microeng. Vol. 22, No. 10, p. 105019	A simple and effective method without vacuum to control the wetting properties of AISI 316L stainless steel using femtosecond laser pulses at high repetition rate has ...
Cyclic strain anisotropy regulates valvular interstitial cell phenotype and tissue remodeling in 3D culture	R.A. Gould, K.Chin, T.P. Santisakultarn, A. Dropkin, J.M. Richards, C.B. Schaffer, J.T. Butcher	Acta Biomater. Vol. 8, No. 5, pp. 1710-1719	Many planar connective tissues exhibit complex anisotropic matrix fiber arrangements that are critical to their biomechanical function. This organized structure is...
Failure mechanism of THz GaAs photoconductive antenna	S.B. Qadri, D.H. Wu, B.D. Graber, N.A. Mahadik, A. Garzarella	Appl. Phys. Lett. Vol. 101, No. 1, p. 011910	We investigated the failure mechanism of THz GaAs photoconductive antenna using high resolution x-ray diffraction topography. From these studies, it was found ...
Femtosecond laser-assisted etching of three-dimensional inverted-woodpile structures in fused Silica	S. Ho, M. Haque, P.R. Herman, J.S. Aitchison	Opt. Lett. Vol. 37, No. 10, pp. 1682-1684	Three-dimensional inverted-woodpile (WP) structures were embedded in a microchannel by femtosecond laser direct-writing of fused Silica followed by chemical etching ...
Fluorescence and Raman microscopy of waveguides fabricated using kHz and MHz repetition rate femtosecond lasers	W.J. Reichman, D.M. Krol, L. Shah, F. Yoshino, A. Arai, S.M. Eaton, P.R. Herman	2006 CLEO Tech. Digest, pp. 1-2	Laser slope efficiencies close to the quantum defect limit and in excess of 78% have been obtained from an ultrafast laser inscribed buried channel waveguide fabricated in ...

2012 (Continued)

Generation of a continuum extending to the midinfrared by pumping ZBLAN fiber with an ultrafast 1550-nm source	C.L. Hagen, J.W. Walewski, S.T. Sanders	IEEE Phot. Tech. Lett. Vol. 18, No. 1, pp. 91-93	Pulses from a commercial Erbium-doped fiber laser are coupled into a standard Silica fiber and a standard Fluoride fiber connected in series. By cascaded Raman soliton ...
Higher-order-mode fiber optimized for energetic soliton propagation	M. Pedersen, J. Cheng, K. Charan, K. Wang, C. Xu, L. Gruener-Nielsen, D. Jakobsen	Opt. Lett. Vol. 37, No. 16, pp. 3459-3461	We describe the design optimization of a higher-order-mode fiber for energetic soliton propagation at wavelengths below 1300 nm. A new HOM fiber is fabricated ...
<i>In vivo</i> two-photon excited fluorescence microscopy reveals cardiac- and respiration-dependent pulsatile flow in cortical blood vessels in mice.	T.P. Santisakultarm, N.R. Cornelius, N. Nishimura, A.I. Schafer, R.T. Silver, P.C. Doerschuk, W.L. Olbricht, C.B. Schaffer	Am. J Physiol. Heart Circ. Physiol. Vol. 302, No. 7, pp. H1367-H1377	Subtle alterations in cerebral blood flow can impact the health and function of brain cells and are linked to cognitive decline and dementia. To understand hemodynamics ...
Measurement of Chloride ion concentration in concrete structures using Terahertz time domain spectroscopy (THz-TDS)	S.R. Tripathi, H. Ogura, H. Inoue, T. Hasegawa, K. Takeya, K. Kawase	Corrosion Sci. Vol. 62, pp. 5-10	We have employed Terahertz time domain spectroscopy (THz-TDS) to investigate the Chloride ion (Cl ⁻) concentration in concrete structures. Cement paste and ...
Microstructuring of Polypyrrole by maskless direct femtosecond laser ablation	K.K.C. Lee, P.R. Herman, T. Shoa, M. Haque, J.D.W. Madden, V.X.D. Yang	Adv. Mat. Vol. 24, No. 9, pp. 1243-1246	Ultrafast laser micromachining was optimized for microstructuring polypyrrole as a facile new approach towards tailoring electrochemical and mechanical ...
Mid-infrared waveguide lasers in rare-earth-doped YAG	Y. Ren, G. Brown, A. Rodenas, S. Beecher, F. Chen, A.K. Kar	Opt. Lett. Vol. 37, No. 16, pp. 3339-3341	We report near-infrared (IR) to mid-IR (up to 3.4 μm wavelength) multimode waveguiding in deep buried channel waveguides fabricated inside rare-earth ...
Multiplex Raman induced Kerr effect microscopy	B.R. Bachler, M.E. Fermann, J.P. Ogilvie	Opt. Exp. Vol. 20, No. 2, pp. 835-844	We report spectrally-resolved chemical imaging based on Raman induced Kerr effect spectroscopy (RIKES). When used with circularly-polarized pump excitation, multiplex ...
Noise analysis and optimization of Terahertz photoconductive emitters	L. Hou, W. Shi, S. Chen	Sel. Top. Quant. Elect. Vol. PP, No. 99, p. 1	The electromagnetic noise generated by terahertz photoconductive emitters was investigated, and the ...
Observation of flat band for Terahertz spoof plasmon in metallic kagome lattice	Y. Nakata, T. Okada, T. Nakanishi, M. Kitano	Phys. Rev. B Vol. 85, pp. 205128-205132	We study the dispersion relation of a metamaterial composed of metallic disks and bars arranged to have kagomé symmetry and find that a plasmonic flat band is ...
Optical quantization for 6 bit photonic A/D conversion	T. Konishi, K. Takahashi, H. Matsui, T. Satoh	IEEE 2012 ICTON Conf. Proc. pp. 1-3	We report the attempt of 6 bit operation of optical quantization for photonic A/D conversion. Efficient optical quantization and optical coding in a bit-parallel format ...
Performance of volume phase gratings manufactured using ultrafast laser inscription	D. Lee, R.R. Thomson, C.R. Cunningham	Proc. SPIE Vol. 8450	Ultrafast laser inscription (ULI) is a rapidly maturing technique which uses focused ultrashort laser pulses to locally modify the refractive index of dielectric materials ...
Precise ablation of dental hard tissues with ultra-short pulsed lasers. Preliminary exploratory investigation on adequate laser parameters	M.S. Bello-Silva, M. Wehner, C. de Paula Eduardo, F. Lampert, R. Poprawe, M. Hermans, M. Esteves-Oliveira	Lasers in Med. Sci. (in press)	This study aimed to evaluate the possibility of introducing ultra-short pulsed lasers (USPL) in restorative dentistry by maintaining the well-known benefits of lasers for lasers ...
Quantitative comparison of contrast and imaging depth of ultrahigh-resolution optical coherence tomography images in 800 - 1700 nm wavelength region	S. Ishida, N. Nishizawa	Biomed. Opt. Exp. Vol.3, No. 2, pp. 282-294	We investigated the wavelength dependence of imaging depth and clearness of structure in ultrahigh-resolution optical coherence tomography over a wide wavelength ...
Quantum dot enabled thermal imaging of optofluidic devices	D. Choudhury, D. Jacque, A. Rodenas, W.T. Ramsay, L. Paterson, A.K. Kar	Lab Chip Vol. 12, No. 13, pp. 2414-2420	Quantum dot thermal imaging has been used to analyse the chromatic dependence of laser-induced thermal effects inside optofluidic devices with monolithically integrated ...

2012 (Continued)

Single- and multi-scan femtosecond laser writing for selective chemical etching of cross section patternable glass micro-channels	S. Ho, P.R. Herman, J.S. Aitchison	Appl. Phys. A Vol. 106, No. 1, pp. 5-13	We report on the fabrication of three dimensional micro-fluidic channels in fused Silica glass using a combination of femtosecond laser writing and hydrofluoric acid wet ...
Spatially resolved measurement of femtosecond laser induced refractive index changes in transparent materials	R. Berlich, J. Choi, C. Mazuir, W.V. Schoenfeld, S. Nolte, M. Richardson	Opt. Lett. Vol. 37, No. 14, pp. 3003-3005	We present a practical method to determine femtosecond laser induced refractive index changes in transparent materials. Based on an iterative Fourier transform ...
Terahertz time domain attenuated total reflection spectroscopy with an integrated prism system	A. Nakanishi, Y. Kawada, T. Tasuda, K. Akiyama, H. Takahashi	Rev. Sci. Instr. Vol. 83, No. 3, p. 033103	We demonstrated attenuated total reflection (ATR) spectroscopy with an integrated prism system that included a Terahertz emitter, a Terahertz receiver, and an ATR ...
Transition of the hydration state of a surfactant accompanying structural transitions of self-assembled aggregates	M. Hishida, K. Tanaka	J. Phys. Cond. Matt. Vol. 24, No. 28, p. 284113	What role does water play in the self-assembly of soft materials? To understand the correlation between the hydration state and the various self-assembled ...
Ultrafast laser inscription of a 121-waveguide fan-out for astrophotonics	R.R. Thomson, R.J. Harris, T.A. Birks, G. Brown, J. Allington-Smith, J. Bland-Hawthorn	Opt. Lett. Vol. 37, No. 12, pp. 2331-2333	Using ultrafast laser inscription, we report the fabrication of a prototype three-dimensional 121-waveguide fan-out device capable of reformatting the output of a 120-core ...
Ultrafast laser inscription of Bragg-grating waveguides using the multiscan technique	G. Brown, R.R. Thomson, A.K. Kar, N.D. Psaila, H.T. Bookey	Opt. Lett. Vol.37, No. 4, pp. 491-493	We report the fabrication of high-strength (> 30 dB) first order Bragg-grating waveguides in borosilicate glass substrates using ultrafast laser inscription. The cross ...

Note: This list was accurate to the best of our knowledge as of Sept. 18, 2012. It is not intended to be a complete or exhaustive list.