

Contents

Part I: Coherent Control

The Odyssey of Kent Wilson: Holding Molecules in the Light D. Herschbach	3
The Kent Wilson Group in the 1990s B. Kohler	10
Algorithms for Closed Loop Ultrafast Control of Quantum Dynamics H. Rabitz	14
Control of Quantum Dynamics by Adaptive Femtosecond Pulse Shaping M. Bergt, T. Brixner, B. Kiefer, M. Strehle, and G. Gerber	19
Optimal Control of Two-Photon Transitions: Bright and Dark Femtosecond Pulses Designed by a Self-Learning Algorithm T. Hornung, R. Meier, D. Zeidler, K.L. Kompa, D. Proch, and M. Motzkus ...	24
Feedback Optimization of Molecular States Using a Parametrization in Frequency and Time Domain T. Hornung, R. Meier, and M. Motzkus	27
Controlling and Probing Impulsively Induced Ground State Vibrational Dynamics E. Gershgoren, S. Ruhman, J. Vala, and R. Kosloff	30
Dynamics and Coherent Control of Condensed Phase Vibrational Coherences V.D. Kleiman, D. McMorow, and J.S. Melinger	33
Spatiotemporal Coherent Control R.M. Koehl and K.A. Nelson	36
Coherent Control and Nonlinear Interactions of Semiconductor Cavity Polaritons Y.S. Lee, A.V. Maslov, D.S. Citrin, and T.B. Norris	39
Coherent Control of XUV Radiation R. Bartels, S. Backus, I. Christov, L. Misoguti, G. Vdovin, E. Zeek, M.M. Murnane, and H.C. Kapteyn	42
Enhancement of $k\alpha$ Yield from Femtosecond Laser Produced Plasmas by Automated Control of Plasma Parameters C. Ziener, I. Uschmann, G. Stobrawa, T. Feurer, H. Schwoerer, R. Sauerbrey ..	45

Part II: Lasers for Ultrashort Pulses

Challenges and Limitations on Generating Few Cycle Laser Pulses Directly from Oscillators

F.X. Kärtner, U. Morgner, R. Ell, C. Jirauschek, G. Metzler, T.R. Schibli, Y. Chen, H.A. Haus, E.P. Ippen, J. Fujimoto, V. Scheuer, G. Angelow, and T. Tschudi 51

Extremely Flexible and Accurate Chirp-Compensation for 75-MHz Repetitive Glass-Fiber Output of a More-Than 100-THz Bandwidth: Generation of a-Few-Optical-Cycle Transform-Limited Pulses

S. Nakamura, L. Li, N. Karasawa, R. Morita, H. Shigekawa, and M. Yamashita 56

14-fs Pulses at 1.3- μ m Generated from an All-Solid-State Cr:Forsterite Laser

C. Chudoba, J.G. Fujimoto, E.P. Ippen, H.A. Haus, U. Morgner, F.X. Kärtner, V. Scheuer, G. Angelow, and T. Tschudi 59

Smooth Dispersion Compensation: Novel Chirped Mirrors with Suppressed Dispersion Oscillations

L. Gallmann, N. Matuschek, D.H. Sutter, V. Scheuer, G. Angelow, T. Tschudi, G. Steinmeyer, and U. Keller 62

Dispersion Management over one Octave with Tilted-Front-Interface Chirped Mirrors

G. Tempea and F. Krausz 65

A Prism-Pair-Formed Pulse Shaper Compresses Optical Pulses to the 6 fs Regime

L. Xu, N. Nakagawa, R. Morita, and M. Yamashita 68

Correcting the Failure of the Slowly Varying Amplitude Approximation for Short Pulses

D. Alterman and J. Rauch 71

Precise Control of the Pulse-to-Pulse Carrier-Envelope Phase in a Mode-Locked Laser

D.J. Jones, S.A. Diddams, J.K. Ranka, R.S. Windeler, A.J. Stentz, J.L. Hall, and S.T. Cundiff 74

Carrier Envelope Offset Phase Stabilization for Few-Cycle Nonlinear Optics

G. Steinmeyer, D.H. Sutter, U. Keller, J. Stenger, and H.R. Telle 79

Sub-10 fs Light Pulses with Stabilized Carrier-Envelope Phase: Optical Waveform Synthesis

A. Poppe, R. Holzwarth, A. Apolonski, G. Tempea, C. Spielmann, T.W. Hänsch, and F. Krausz 82

Frequency Domain Control of Femtosecond Pulse Trains

with Fabry-Perot Reference Cavities for Optical Frequency Metrology
R.J. Jones and J.C. Diels 87

Nonlinear Optical Method for Determining the Absolute Carrier Phase of a Laser Pulse	
M. Mehendale, S.A. Mitchell, D.M. Villeneuve, and P.B. Corkum	90
Generation of Relativistic Intensity Pulses at 300 Hz Repetition Rate	
H. Wang, O. Albert, J. Nees, D. Liu, G. Mourou, and Z. Chang	93
Reflection Double Pass Ti:Sapphire Continuous-Wave Amplifier Delivering 5.77 W Average Power, 82 MHz Repetition Rate, 100 fs Pulse	
Z. Liu, H. Murakami, T. Kozeki, H. Ohtake, and N. Sarukura	96
Chirped Pulse Amplification for Ultraviolet Femtosecond Pulses Using Ce:LiCAF Crystal	
Z. Liu, T. Kozeki, Y. Suzuki, N. Sarukura, K. Shimamura, T. Fukuda, M. Hirano, and H. Hosono	99
Parabolic Pulses from Yb:Fiber Amplifiers: A New Paradigm for High Power Ultrashort Pulse Generation	
J.D. Harvey, J.M. Dudley, V.I. Kruglov, B.C. Thomsen, and M.E. Fermann	102
Generation, Amplification and Characterization of Tunable Visible Ultrashort Shaped Pulses	
H.S. Tan, W.S. Warren, and E. Schreiber	105
Synthesis of Supershort UV Pulses Using Phase-Locked Raman Side-Band Generation	
G. Korn, A. Nazarkin, and M. Wittmann	108
Generation and Measurement of Ultrafast Tunable VUV Light	
L. Misoguti, C.G. Durfee, S. Backus, M.M. Murnane, and H.C. Kapteyn	112

Part III: Pulse Characterization, Shaping and Measurement Techniques

Autocorrelation Measurement of Femtosecond Optical Pulses Using Two-Photon-Induced Photocurrent in a Photomultiplier Tube	
T. Hattori, Y. Kawashima, M. Daikoku, H. Inouye, and H. Nakatsuka	117
Precision and Accuracy of Ultrashort Optical Pulse Measurement Using SPIDER	
E.M. Kosik, M.E. Anderson, L.E.E. de Araujo, C. Dorrer, and I.A. Walsmsley	120
Highly Simplified Ultrashort Pulse Measurement	
P. O'Shea, M. Kimmel, X. Gu, and R. Trebino	123
Time-Gated FROG: A New Technique for Studying the Build-Up of Optical Pulse Field in Mode-Locked Ultrafast Lasers	
Y.S. Hsing, J.M. Hsieh, and C.L. Pan	126
Measuring the Intensity and Phase of Ultrabroadband Continuum	
L. Xu, M.W. Kimmel, P. O'Shea, R. Trebino, J.K. Ranka, R.S. Windeler, and A.J. Stentz	129

Amplitude and Phase Measurement of Mid-IR Femtosecond Pulses Using XFROG D.T. Reid, P. Loza-Alvarez, C.T.A. Brown, T. Beddard, and W. Sibbett	132
Rapid Retrieval of Ultrashort Pulse Amplitude and Phase from a Sonogram Trace I.G. Cormack, W. Sibbett, and D.T. Reid	135
Simultaneous Two-Dimensional Space and Time Measurement of Ultrashort Optical Pulses Based on Spatial Spectral Interferometry T. Tanabe, N. Takei, H. Tanabe, and F. Kannari	138
Reliability of Fourier-Transform Spectral Interferometry N. Belabas, C. Dorrer, J.P. Likforman, and M. Joffre	141
Direct Measurement of Spectral Phase of Femtosecond Pulses Using Optical Parametric Effect K. Naganuma and S. Ishibashi	144
Ultrashort Pulse Characterization by Frequency Resolved Pump Probe M.S. Pshenichnikov, A. Baltuska, F. deHaan, and D.A. Wiersma	147
Attosecond Cross Correlation Technique A. Scrinzi, M. Geissler, and T. Brabec	150
Unbalanced Multiphoton Autocorrelation Techniques for fs Pulse Measurements in the Near IR S. Marzenell, P. Mahnke, and R. Beigang	153
Unbalanced Third-Order Correlations for Characterizing the Intensity and Phase of Femtosecond Pulses J.W. Nicholson, M. Mero, J. Jasapara, and W. Rudolph	156
Spectral Phase Correlator for Coded Waveform Recognition Using Second Harmonic Generation Z. Zheng, A.M. Weiner, K.R. Parameswaran, M.H. Chou, and M.M. Fejer	159
Femtosecond Nonlinear Polarization Evolution from Cascade Quadratic Processes X. Liu, F.O. Ilday, K. Beckwitt, and F.W. Wise	162
Femtosecond Polarization Detection Using High-Speed Pulse Shaping D. Keusters, P. Tian, and W.S. Warren	165
Tunable Third-Order Dispersion of a Prismatic Pulse Compressor K. Osvay, P. Dombi, A.P. Kovacs, J. Klebniczki, G. Kurdi, and Z. Bor	168
Nonlinear Dispersion Properties of Sub-Wavelength Photonic Crystals S. Vijayalakshmi, Y. Zhang, G. Yaglioglu, R. Dorsinville, C.W. White, and H. Grebel	171
Carrier-Induced Optical Pulse Shaping in a Semiconductor Nonlinear Bragg Reflector K. Ogawa and Y. Matsui	174

20-fs Pulse Shaping with a 512-Element Phase only Liquid Crystal Modulator H. Wang, Z. Zheng, D.E. Leaird, A.M. Weiner, T.A. Dorschner, J.J. Fijol, L.J. Friedman, H.Q. Nguyen, and L.A. Palmaccio	177
Coherently Controlled Shaping of Ultrafast Electric-Field Transients in the Mid-Infrared F. Eickemeyer, R.A. Kaindl, M. Woerner, and A.M. Weiner	180
Spatial Replenishment and Self-Focusing Dynamics of Ultrashort Laser Pulses K.D. Moll and A.L. Gaeta	183
Femtosecond Pulse Propagation in Optical Fibers F.G. Omenetto, D. Yarotski, and A.J. Taylor	186
Microcavity-Enhanced Surface-Emitted Second-Harmonic Generation for Signal Processing in the ps and fs Regimes T.G. Ulmer, B.R. Washburn, A.J. SpringThorpe, C.M. Verber, and S.E. Ralph ..	189
Femtosecond Time-Resolved Fluorescence Spectroscopy Utilizing Optical Kerr Shutter: Direct Observation of a Temporal Fluorescence Band Shape T. Nagahara, Y. Kanematsu, and T. Okada	192

Part IV: THz Generation and Measurement

An intense Broadband Terahertz Source Based on a Novel Four-Wave Rectification Process D.J. Cook, J.X. Chen, and R.M. Hochstrasser	197
THz Generation by Photo-Ionization of Electrically Biased Air T. Löffler, F. Jacob, and H.G. Roskos	200
Coherent THz Emission from Optically Pumped Intersubband Plasmons in Parabolic Quantum Wells R. Bratschitsch, T. Müller, R. Kersting, G. Strasser, and K. Unterrainer	203
Narrow-Band Terahertz Wavetrains Generated by Optical Rectification in Periodically-Poled Lithium Niobate T. Meade, Y.S. Lee, V. Perlin, H. Winful, T.B. Norris, and A. Galvanauskas ...	206
Optimum Geometrical Conditions for Femtosecond Laser Irradiated Magnetic-Field Enhanced THz Radiation InAs Emitter and its Saturation Effect in High-Magnetic Field H. Ohtake, S. Ono, M. Sakai, Z. Liu, H. Murakami, and N. Sarukura	209
Tunable Coherent far Infrared Radiation Emission from Biased Semiconductor Microcavities R. Harel, I. Brener, L.N. Pfeiffer, K.W. West, J.M. Vandenberg, S.G. Chu, and J. Wynn	212
Amplitude and Phase Resolved Detection of Tunable Femtosecond Pulses with Frequency Components Beyond 100 THz A. Brodschelm, F. Tausser, R. Huber, J.Y. Sohn, and A. Leitenstorfer	215

Ultrabroadband Detection of THz Radiation by LT-GaAs Photoconductive Antenna Gated with 15-fs Pulses S. Kono, M. Tani, P. Gu, and K. Sakai	218
A Simple Terahertz Spectrometer T.F. Crimmins, M.J. Gleason, D.W. Ward, and K.A. Nelson	221
Ultrafast Applications of THz Waveguides D. Grischkowsky, G. Gallot, S.P. Jamison, and R.W. McGowan	224
Variable Angle Impulse Ranging and Image Reconstruction of Dielectric Cylinders M.T. Reiten, D. Grischkowsky, and R.A. Cheville	229
Dielectric Property Measurement of Sub-Micron Thin Film by Differential Time-Domain Spectroscopy K.S. Lee, J.Y. Kim, J. Fortin, Z. Jiang, M. Li, T.M. Lu, and X.C. Zhang	232
Excitation Dynamics Beyond the Slowly Varying Envelope Approximation R. Kersting, R. Bratschitsch, G. Strasser, and K. Unterrainer	235
THz-Pulse Studies of Superluminal Propagation in Frustrated Total Internal Teflection J.J. Carey, J. Zawadzka, D.A. Jaroszynski, and K. Wynne	238

Part V: Imaging and Microscopy

Optical Coherence Tomography for Biomedical Imaging J. Fujimoto, W. Drexler, X. Li, I. Hartl, C. Chudoba, U. Morgner, F. Kärtner, C. Pitris, E. Ippen, and M. Brezinski	243
Ultrahigh Resolution OCT Using Continuum Generation in an Air-Silica Microstructure Optical Fiber I. Hartl, X.D. Li, C. Chudoba, R. Ghanta, T. Ko, J.G. Fujimoto, J.K. Ranka, R.S. Windeler, and A.J. Stentz	248
Intracellular Water Diffusion Probed by Femtosecond Nonlinear CARS Microscopy E.O. Potma, W.P. de Boeij, and D.A. Wiersma	251
Ultrafast Near-Field Pump-Probe Spectroscopy of Quasi-One-Dimensional Transport in a Single Quantum Wire V. Emiliani, T. Guenther, C. Lienau, T. Elsaesser, R. Nötzel, and K.H. Ploog ..	256
Femtosecond Near-Field Scanning Optical Microscopy of Molecular Thin Films H. Kawashima, M. Furuki, S. Tatsuura, M. Tian, Y. Sato, L.S. Pu, and T. Tani ..	259
Background-Free THz Imaging Using Interferometric Tomography J.L. Johnson, T.D. Dorney, and D.M. Mittleman	262
Diagnosis of Dental Cavity and Osteoporosis Using Terahertz Transmission Images J. Ryu, Y. Jung, S. Baek, J. Lee, S. Kim, S. Kwon, and J. Kim	265

Part VI: X-Ray Generation and Diffraction, Higher Harmonics, High Intensity Physics

Femtosecond X-Ray Pulses from a Synchrotron R.W. Schoenlein, H.H.W. Chong, T.E. Glover, P.A. Heimann, C.V. Shank, A.A. Zholents, and M.S. Zolotarev	271
Direct Observation of Ultrafast Non-Thermal Melting by Ultrafast X-Ray Diffraction C.W. Siders, A. Cavalleri, K. Sokolowski-Tinten, C. Toth, T. Guo, M. Kammler, M. Horn von Hoegen, K.R. Wilson, D. von der Linde, and C.P.J. Barty	276
Time-Resolved X-Ray Diffraction Study of Ultrafast Acoustic Phonon Dy- namics in Ge/Si Heterostructures K. Sokolowski-Tinten, A. Cavalleri, C.W. Siders, F.L.H. Brown, D.M. Leitner, C. Toth, M. Kammler, M. Horn von Hoegen, D. von der Linde, J.A. Squier, C.P.J. Barty, and K.R. Wilson	281
Picosecond Time-Resolved X-Ray Diffraction from a Silicon Crystal under Laser-Induced Breakdown K.G. Nakamura, Y. Hironaka, A. Yazaki, F. Saito, and K. Kondo	284
Time-Resolved X-Ray Measurements of Polaron Dynamics of Charge-Ordered $\text{Nd}_{1/2}\text{Sr}_{1/2}\text{MnO}_3$ I. Kang, S. Johnson, A. Lindenberg, R. Falcone, T. Missalla, P. Heimann, K.H. Kim, T. Katsufuji, and S.W. Cheong	287
High-Order harmonic Generation in the Few-Optical Cycle Regime: Spectral Characteristics and Modeling S. De Silvestri, G. Cerullo, M. Nisoli, E. Priori, S. Stagira, O. Svelto, L. Poletto, G. Tondello, P. Villoresi, C. Altucci, R. Bruzzese, and C. de Lisio	290
Nonadiabatic Self-Phase Matching of High Harmonic Generation G. Tempea, M. Geissler, M. Schnürer, F. Krausz, and T. Brabec	293
Diffraction Limited Emission of High Order Harmonics from Solid Surfaces A. Tarasevitch, C. Dietrich, A. Orisch, and D. von der Linde	296
Femtosecond Time-Resolved Luminescence Spectroscopy of Inner-Shell Excitation by High-Order Harmonics T. Sekikawa, T. Yamazaki, S. Miura, Y. Nabekawa, and S. Watanabe	299
Femtosecond X-Ray Fluorescence from Light Elements Excited by Laser Harmonics M. Hentschel, M. Schnürer, R. Kienberger, C. Spielmann, F. Krausz, C. Streli, and P. Wobrauschek	302
Emission of Highly-Charged Ions of Heavy Elements from a Picosecond Laser-Produced Plasma J. Badziak, J. Makowski, P. Parys, J. Wolowski, E. Woryna, and A.B. Vankov	305

Evanescent-Wave Acceleration of Ultrashort Electron Pulses J. Zawadzka, D.A. Jaroszynski, J.J. Carey, and K. Wynne	308
Pulse Compression in Plasma: Generation of Femtosecond Pulses without CPA G. Shvets, N.J. Fisch, A. Pukhov, and J. Meyer-ter-Vehn	311
Dynamic Stark Effect in Rydberg NO Induced by Intense Laser Pulses R.B. Lopež-Martens, T.W. Schmidt, and G. Roberts	314
Ultrafast Transient Grating Study of Molecules After High Intensity Excitation M. Comstock, I. Pastirk, and M. Dantus	317

Part VII: Ultrafast Dynamics of Atoms, Molecules and Clusters in the Gas Phase

Stepwise Electron Emission from Autoionizing Magnesium Stark States J.B.M. Warntjes, C. Wesdorp, F. Robicheaux, and L.D. Noordam	323
Centrifugal Dissociation of a Molecule Using the Optical Centrifuge D.M. Villeneuve, S.A. Aseyev, P. Dietrich, M. Spanner, M.Y. Ivanov, and P.B. Corkum	326
State-Selective Rotational Coherence Spectroscopy by Two-Color Pump-Probe Schemes A. Weichert, C. Riehn, and B. Brutschy	331
Vibrational Revivals in the Iodine B-State from Femtosecond Fluorescence Interference Noise C. Warmuth, A. Tortschanoff, F. Milota, M. Leibscher, I.S. Averbukh, W. Jakubetz, and H.F. Kauffmann	335
Untangling π - π^*/n - π^* Orbital Interactions via Ultrafast Time-Resolved Photoelectron Spectroscopy J.P. Shaffer, T. Schultz, M. Schmitt, J.G. Underwood, and A. Stolow	338
Change of Ultrafast Ammonia Cluster Dynamics by a Femtosecond Infrared Control Pulse P. Farmanara, V. Stert, H.H. Ritze, and W. Radloff	341
Observation of the Lorentz Local Field in a Dense Atomic Vapor Using Transient Spectroscopy S.T. Cundiff, J.M. Shacklette, and E.A. Gibson	344

Part VIII: Ultrafast Processes in Semiconductors

Resonant Rayleigh Scattering from Semiconductor Nanostructures: Ultrafast Spectral Interferometry D. Birkedal, A. Shchegrov, and J. Shah	349
Radiative Interwell Coupling of hh-,lh-Excitons, and Correlated Electron-Hole Pairs in Multiple Quantum Well Bragg Samples D. Ammerlahn, J. Kuhl, B. Grote, S.W. Koch, G. Khitrova, and H. Gibbs	354

Highly Energetic Excitons in GaAs Studied via Femtosecond Transmission Spectroscopy A. Leitenstorfer, G. Göger, M. Betz, M. Bichler, W. Wegscheider, and G. Abstreiter	357
Ultrafast Electro-Absorption at the Transition Between Classical and Quantum Response A.H. Chin and J. Kono	360
Sub-Picosecond Dynamics of the Photo-Induced Magneto-Optical Kerr Effect in CdTe at Room Temperature A.V. Kimel, F. Bentivegna, V.N. Gridnev, V.V. Pavlov, R.V. Pisarev, and T. Rasing	363
Femtosecond Optical Time-of-Flight Measurement of the Electron Velocity in GaN M. Wraback, H. Shen, J.C. Carrano, T. Li, and J.C. Campbell	366
Femtosecond Intersubband Dynamics of Holes in P-Type $\text{Si}_{1-x}\text{Ge}_x/\text{Si}$ Multiple Quantum Wells R.A. Kaindl, M. Wurm, K. Reimann, M. Woerner, T. Elsaesser, C. Miesner, K. Brunner, and G. Abstreiter	369
Femtosecond Mid-Infrared Study of Electron Dynamics in Self-Organized InAs Quantum Wires on InAlAs/InP (001) E. Peronne, T. Polack, J.F. Lampin, A. Alexandrou, F. Fossard, F.H. Julien, J. Brault, and M. Gendry	372
Size and Surface Dependence of Ultrafast Carrier Dynamics in CdSe Quantum Dots Determined by Fluorescence Upconversion Spectroscopy D.F. Underwood, T. Kippeny, R. Ward, A.V. Kadavanich, J. Taylor, and S.J. Rosenthal	375
Investigation of Phase Change in $\text{Ge}_2\text{Sb}_2\text{Te}_5$ Films by Coherent Phonon Spectroscopy M. Först, T. Dekorsy, M. Laurenzis, C. Trappe, H. Kurz, and B. Bechevet	378
Generation of Coherent LO Phonons in GaAs/AlGaAs MQWs by the Impul- sive Stimulated Raman Scattering K.J. Yee, Y.S. Lim, and D.S. Kim	381
Observation of Coherent Confined LO Phonons in $^{70}\text{Ge}/^{74}\text{Ge}$ Isotope Superlattices M. Nakajima, H. Harima, K. Morita, K.M. Itoh, K. Mizoguchi, E.E. Haller, and M. Hangyo	384
Effect of Lattice Defects on LO Phonon-Plasmon Coupled Modes in n-GaAs M. Hase, K. Ishioka, M. Kitajima, and K. Ushida	387

Part IX: Isolators, Metals and Superconductors

Ultrafast Dynamics of Excitonic Self-Trapping:

The Role of the Electron-Phonon Interaction

A.D. Van Pelt and L. Dexheimer 393

Femtosecond and Attosecond Giant Optical Responses and Fluctuations

in Disordered Clusters, Nanocomposites, and Rough Surfaces

M.I. Stockman 398

Electron Energy Relaxation Dependent on Size and Matrix

in Gold Nanocrystal-Dielectric Composites

Y. Hamanaka, J. Kuwabata, A. Nakamura, I. Tanahashi, and S. Omi 401

Femtosecond Photoemission Studies of the Transient Electron Temperature

in Supported Metal Nanoparticles

M. Merschdorf, W. Pfeiffer, A. Thon, S. Voll, and G. Gerber 404

Acoustic Vibrations of Silver Nanoparticles

S. Gresillon, M. Perner, G. von Plessen, J. Feldmann, J. Porstendorfer,

K.J. Berg, and G. Berg 407

Ultrafast Interferometric Studies of Multiple Scattering of Light

in Photonic Structures

Y.H. Liao and N.F. Scherer 410

Resolving Ultrafast Dynamics of Electron Thermalization in Gold

Using Surface SHG

C. Guo, G. Rodriguez, and A.J. Taylor 413

Analysis of Hot Electron Cascades in Copper

M.J. Weida, S. Ogawa, H. Nagano, and H. Petek 416

Phonon Pair Combination States Driven by Second-Order Raman Scattering

in KTaO_3

A. Bartels, T. Dekorsy, and H. Kurz 419

Temporally Decorrelated Multifocal Array for High-Speed,

High-Resolution Multiphoton Imaging and Micromachining

D.N. Fittinghoff and J.A. Squier 422

Femtosecond Laser-Induced Ablation of Graphite

K. Sokolowski-Tinten, S. Kudryashov, V. Temnov, J. Bialkowski,

D. von der Linde, A. Cavalleri, H.O. Jeschke, M.E. Garcia,

and K.H. Bennemann 425

Femtosecond Mid-Infrared Study

of the High- T_c Superconductor $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$

M. Woerner, R.A. Kaindl, T. Elsaesser, D.C. Smith, J.F. Ryan, G.A. Farnan,

M.P. McCurry, and D.G. Walmsley 428

Observation of the Josephson Plasma Resonance in $\text{Tl}_2\text{Ba}_2\text{CaCu}_2\text{O}_8$

Using THz Spectroscopy

V.K. Thorsmolle, R.D. Averitt, M.P. Maley, L.N. Bulaevskii, and A.J. Taylor . . 431

Ultrafast THz Conductivity Dynamics: Spin-Lattice Relaxation in Colossal Magnetoresistive Oxides R.D. Averitt, A.I. Lobad, C. Kwon, S.A. Trugman, V.K. Thorsmolle, and A.J. Taylor	434
---	-----

Part X: Electron Dynamics and Charge Transfer at Interfaces and in Liquids

Femtosecond Electron Dynamics at Surfaces and Interfaces C.B. Harris, A.D. Miller, S.H. Liu, and K.J. Gaffney	439
Spectral Sensitization, Supersensitization and Ultrafast Exciton Migration on AgBr Semiconductor Surface I.V. Rubtsov, K. Ebina, K. Yoshihara, J. Knoester, T. Suzumoto, and T. Tani ..	444
Ultrafast Interfacial Charge Separation from the Singlet and Triplet MLCT States of Ru(bpy) ₂ (dcbpy) Adsorbed on Nanocrystalline SnO ₂ under Applied Bias S. Iwai, K. Hara, R. Katoh, S. Murata, H. Sugihara, and H. Arakawa	447
Femtosecond IR Study of Ultrafast Electron Injection in Nanocrystalline Thin Film Electrodes J.B. Asbury, E. Hao, Y. Wang, and T. Lian	450
Unique Curve Crossing and Vibrational Wavepacket Behavior of Femtosecond Heterogeneous Electron Transfer C. Zimmermann, F. Willig, S. Ramakrishna, B. Pettinger, B. Burfeindt, N. Biswas, and R. Eichberger	453
Surface States Control Ultrafast Electron Injection in Dye/Semiconductor Colloidal Systems R. Huber, S. Spörlein, J.E. Moser, M. Grätzel, and J. Wachtveitl	456
THz Pump-Probe Measurements of Electrons in Nonpolar Liquids E. Knoesel, J. Shan, M. Bonn, M. Wolf, and T.F. Heinz	459
Photon-Echo Spectroscopy of the Hydrated Electron with 5-fs Pulses M.S. Pshenichnikov, A. Baltuska, M.F. Emde, and D.A. Wiersma	464
Ultrafast Thermalization Dynamics of Hot Photoelectrons Injected into Water V.H. Vilchiz, J.A. Kloepper, A.C. Germaine, V.A. Lenchenkov, and S.E. Bradforth	467
Mid-IR Detection of a Precursor to the Prehydrated Electron N.A. Anderson, K. Hang, J.B. Asbury, and T. Lian	470
Novel fs-Precursors of Solvated Electrons in Water in the MIR: A Charge Transfer Process R. Laenen, T. Roth, and A. Laubereau	473
Femtosecond Study of Electron Photo Detachment from Complex Anions: Fe(CN) ₆ ⁴⁺ and CuBr ₂ ⁻ in H ₂ O V. Lenchenkov, V. Vilchiz, J. Kloepper, and S. Bradforth	476

Femtosecond Studies of the Charge-Transfer-to-Solvent Transition of the Sodium Anion in THF E.R. Barthel, I.B. Martini, and B.J. Schwartz	479
(Sub)picosecond Time-Resolved Fluorescence Depolarization of OLED Compounds Alq ₃ , Gaq ₃ , and Inq ₃ E. van Veldhoven, H. Zhang, and M. Glasbeek	482
Investigation of the Ultrafast Dynamics of Charge Recombination of Ion Pairs Using Multiplex Transient Grating Spectroscopy E. Vauthey	485
Ultrafast Adiabatic Electron Transfer Cooperated with Exciplex Formation Induced by Strong Interaction Between Donor and Acceptor at Short Distances S. Iwai, S. Murata, and M. Tachiya	488
Femtosecond Multicolor Pump-Probe Investigation of Ultrafast Electron Transfer of (NH ₃) ₅ Ru ^{III} NCRu ^{II} (CN) ₅ ⁻ in Solution D.H. Son, P. Kambhampati, T.W. Kee, and P.F. Barbara	491
Ultrafast Solvent-Induced Charge Localization in Tris-(2,2'-Bipyridine) Ruthenium(II) A.T. Yeh, C.V. Shank, and J.K. McCusker	494

Part XI: Two-Dimensional Spectroscopy

Structural Dynamics of Small Peptides by Time Dependent 2D-IR spectroscopy S. Woutersen and P. Hamm	499
Frequency Resolved and Heterodyned Femtosecond Infrared Echoes of Peptides: Multiple Pulse Coherent Vibrational Analogues of NMR M.T. Zanni, M.C. Asplund, S.M. Decatur, and R.M. Hochstrasser	504
Nonlinear Two-Dimensional IR Spectroscopy of Unfolding Processes in β -Peptides C. Scheurer, A. Piryatinski, and S. Mukamel	507
Diffraction Optics Based 2-Colour Six Wave Mixing: Heterodyne Detection of the Fifth-Order Raman Response of Liquids V. Astinov, K.J. Kubarych, C.J. Milne, S. Lin, and R.J. Dwayne Miller	510
Polarized and Magic Angle Fifth-Order 2D Electronically Non-Resonant Raman Scattering from CS ₂ D.A. Blank, L.J. Kaufman, and G.R. Fleming	513
Separating the Direct and Cascaded Contributions to Two-Dimensional Signals Using Phase-Sensitive Detection O. Golonzka, N. Demirdöven, and A. Tokmakoff	516
Time Dependent 2D Fourier Transform Spectra Reveal Femtosecond Solvation Dynamics J.D. Hybl, A.W. Albrecht, and D.M. Jonas	519

Two-Dimensional Time-Resolved THz Spectroscopy of Solvent Response to Photoexcitation	
M.C. Beard, G.M. Turner, and C.A. Schmittenmaer	522

Part XII: Dynamics in Liquids

Ultrafast Intermolecular Transfer of Vibrational Excitations in Liquid Water	
S. Woutersen and H.J. Bakker	527
Time and Frequency-Gated FID: A New Approach to Study the Vibrational Dephasing of Water	
J.A. Gruetzmacher and N.F. Scherer	530
Observation of the Bose Peak in Nanometer-Sized Liquid Water Clusters Using Terahertz Spectroscopy	
J. Boyd, A. Briskman, V. Colvin, and D. Mittleman	533
Interaction of Terawatt Laser Pulses with Neat Water	
S. Pommeret, F. Gobert, M. Mostafavi, I. Lampre, P. Pernot, R. Haidar, S. Buguet, G. Vigneron, and J.C. Mialocq	536
Picosecond Infrared Spectroscopy of Carboxylic Acid Dimers in Liquid Solution and Water-in-Oil Microemulsions	
G. Seifert, T. Patzlaff, M. Janich, and H. Graener	539
Ultrafast Coherent Response of Hydrogen Bonds	
J. Stenger, D. Madsen, J. Dreyer, E.T.J. Nibbering, P. Hamm, and T. Elsaesser	542
Phase-Sensitive Detection for Polarization-Selective Femtosecond Raman Spectroscopy	
M. Khalil, O. Golonzka, N. Demirdöven, and A. Tokmakoff	545
Studies of the Third and Fifth Order Nonlinear Susceptibilities of Optical Materials Using Femtosecond Transient Absorption Spectroscopy	
K. Ekvall, C. Lundevall, and P. van der Meulen	548
Nuclear Dynamics in the Ground and Excited Electronic States for a Molecule in Liquid	
J.S. Park and T. Joo	551
Ultrafast Solute Vibrational Spectral Evolution During the Solvation Process	
J.B. Asbury, Y. Wang, and T. Lian	554
Separating Inertial and Diffusive Rotation and Solvation for a Nonpolar Solute	
Y. Zhang, J. Jiang, and M.A. Berg	557
Solute Dependence of Three Pulse Photon Echo Peak Shift Measurement	
Y. Nagasawa, A. Watanabe, and T. Okada	560
Ultrafast Dynamics in DNA	
E.B. Brauns, M.M. Madaras, R.S. Coleman, C.J. Murphy, and M.A. Berg	563
Femtosecond Photophysics of DNA and RNA Nucleosides in Aqueous Solution	
J.M. Pecourt, J. Peon, and B. Kohler	566

Investigation of Coherent Dynamics in Charge-Transfer Reaction of Plastocyanin S. Nakashima, Y. Nagasawa, T. Okada, M. Sato, and T. Kohzuma	569
---	-----

Part XIII: Polymers, Aggregates, and Macromolecular Systems

Vibrational Dynamics in Molecules and Polymers Revealed by Sub-5-fs Real-Time Spectroscopy T. Kobayashi	575
Early Events in the Photoexcitation of π -Conjugated Chains Studied with Sub-10-fs Time Resolution G. Cerullo, M. Zavelani-Rossi, G. Lanzani, and S. De Silvestri	580
Direct Probe of Spectrally Line-Narrowed Emission from Cooperative Optical State in π -Conjugated Polymeric Thin Films S.C. Jeoung and D. Kim	583
Mapping of Molecular Docking of Organic Cations on Negatively Charged Polymers by Picosecond Time Resolved Fluorescence Spectroscopy D. Pines, J. Cohen, Y. Zhao, V. Khutorsky, Z. Priel, and E. Pines	586
Direct Observation of the Ultrafast Electron Transfer Process in a Polymer/Fullerene Blend C.J. Brabec, G. Zerza, N.S. Sariciftci, G. Cerullo, G. Lanzani, S. De Silvestri, and J.C. Hummelen	589
The Controlled Coherent Excitation of Vibrational Modes in the Electronic Ground State of Polydiacetylenes T. Chen, A. Vierheilg, W. Kiefer, and A. Materny	592
Molecular Dynamics Simulations of Collective Electronic and Nuclear Modes in Conjugated Systems M. Tommasini, V. Chernyak, and S. Mukamel	595
Theoretical Investigation of the Excited States Dynamics of the Polydiacetylene Backbone T. Barisien, M. Turki, C. Daniel, and J.Y. Bigot	598
Ultrafast Energy Relaxation Processes of Long Molecular Wires Based on Zinc(II)porphyrines Y.H. Kim, D.H. Jeong, S.C. Jeoung, D. Kim, N. Aratani, and A. Osuka	601
Dynamic Intensity Borrowing in Porphyrin J-Aggregates Revealed by Sub-5 fs Spectroscopy H. Kano, T. Sato, and T. Kobayashi	604
Wavepacket Motion of Self-Trapped Exciton under Excitation by Femtosecond Chirped Pulses in One-Dimensional Metal Dimethyl-Glyoxime Complex S. Iwai, T. Kamata, S. Murata, and K. Yamamoto	607

Energy Funneling in the Dendrimeric Nanostar Probed by Time-Resolved Nonlinear Spectroscopies J.C. Kirkwood, C. Scheurer, T. Minami, V. Chernyak, and S. Mukamel	610
Ultrafast Investigations of Intramolecular Interactions and Energy Transfer in Dendrimers and Polymeric Materials T. Goodson	613
Systematic Fluorescence Upconversion Investigation of Intramolecular Processes in Peryleneimide Dendrimers Containing One to Four Chromophors G. Schweitzer, G. De Belder, S. Jordens, S. Mitra, M. Lor, and F.C. De Schryver	616

Part XIV: Ultrafast Chemistry

Experimental and Theoretical Study of Chirped Pulse Excitation B.D. Fainberg, D. Huppert, and J. Segal	621
Probing CTTS Dynamics of Na^+ in THF: Novel Relaxation and Polarization Effects Z. Wang, O. Shoshana, and S. Ruhman	624
The Ultrafast Dissociation Dynamics of Iodine Embedded in Microporous Crystalline Porosils of Different Structure G. Flachenecker and A. Materny	627
Ultrafast Dynamics in ClO_2 and $\text{ClO}_2(\text{H}_2\text{O})_n$ Excited at 398 nm V. Stert, H.H. Ritze, P. Farmanara, F. Tschirschwitz, E.T.J. Nibbering, and W. Radloff	630
Vibrational Mode-Specific Ultrafast Photodissociation Dynamics of Chlorine Dioxide in Solution H. Fidder, F. Tschirschwitz, O. Dühr, and E.T.J. Nibbering	633
Ultrafast Infrared Studies of Ligand Rearrangement at Coordinatively Unsaturated Transition Metal Centers K.T. Kotz, H. Yang, P.T. Snee, C.K. Payne, and C.B. Harris	636
Ultrafast Fragmentation Dynamics of the Dicarbonyl(cyclopentadienyl)iron Halides M. Bergt, N. Damrauer, C. Dietl, B. Kiefer, and G. Gerber	639
Time-Resolved Photoelectron Spectroscopy of Excited State Intramolecular Proton Transfer Dynamics S. Lochbrunner, M. Schmidt, J.P. Shaffer, T. Schultz, and A. Stolow	642
Does the Proton Move During Ultrafast Excited State Intramolecular Proton Transfer? E. Riedle, S. Lochbrunner, A.J. Wurzer, V. de Waele, and R. de Vivie-Riedle . .	645
Direct Observation of Ultrafast Excited State Dynamics in Condensed Phase Photochemistry and Photobiology R.J. Sension, A.G. Cole, N.A. Anderson, and J.J. Shiang	648

Part XV: Biology

Disorder in Photosynthetic Light Harvesting Complexes: A Three-Pulse Photon Echo Peak Shift Study of the B800 Band of the LH2 Complex R. Agarwal, M. Yang, and G.R. Fleming	653
Highly Unusual Growing-in of Coherence and Strong Oscillations in the Bacterial FMO Antenna Complexes Observed in Photon Echo Kinetics V.I. Prokhorenko, A.R. Holzwarth, F.R. Nowak, and T.J. Aartsma	656
Time-Dependent Exciton Delocalization Size in the B850 Band of Purple Bacterial LH2 L.D. Book, A.E. Ostafin, N. Ponomarenko, J.R. Norris, S. Mukamel, and N.F. Scherer	659
The Kinetics of Primary Electron Transfer Steps in PS I Reaction Centers S. Savikhin, P. Martinson, P. Chitnis, W. Johnson, W. Xu, and W. Struve	662
Ultrafast Charge Separation in the Plant Photosystem I Reaction Center S. Kumazaki, I. Ikegami, S. Yasuda, and K. Yoshihara	665
Direct Observation of the S ₁ Level of the Carotenoid Spheroidene Using Near-Infrared Femtosecond Spectroscopy T. Polivka, D. Zigmantas, J.L. Herek, J.A. Bautista, H.A. Frank, and V. Sundström	668
Femtosecond-Transient Absorption and Fluorescence Upconversion after Two-Photon Excitation of Carotenoids in Solution and in LHC II P.J. Walla, P.A. Linden, and G.R. Fleming	671
Quantitative Modeling of Ultrafast Energy Transfer Dynamics in the Photosynthetic Apparatus X.J. Jordanides, G.D. Scholes, and G.R. Fleming	674
Primary Reactions of Sensory Rhodopsins: Two Proteins with Vastly Different Dynamics I. Lutz, A. Sieg, I. Boche, M. Otsuka, D. Oesterhelt, J. Wachtveitl, and W. Zinth	677
Femtosecond Spectroscopy and Model Calculations for an Understanding of the Primary Reaction in Bacteriorhodopsin W. Zinth, A. Sieg, P. Huppmann, T. Blankenhorn, D. Oesterhelt, and M. Nonella	680
Resolving the Primary Dynamics of Bacteriorhodopsin and Locked Analogs in the Reactive Excited States T. Ye, B. Hou, E. Gershgoren, M. Ottolenghi, N. Friedman, M. Sheves, and S. Ruhman	683
Coherent Infrared Emission from Myoglobin Crystals M.L. Groot, M.H. Vos, I. Schlichting, and J.L. Martin	686

Femtosecond Fluorescence Dynamics of Porphyrins; Internal Conversion, Energy Relaxation and Quantum Beats Y. Shibata, H. Chosrowjan, N. Mataga, N. Yoshida, and A. Osuka	689
Femtosecond Pump-Probe Studies of Radiationless Decay Dynamics in Anthropod and Mollusc Hemocyanins M.D. Edington, J.S. Floyd, N.M. Haralampus-Grynaviski, T. Ye, B. Zheng, and J.D. Simon	692
Initial Conformational Dynamics in Cyclic Azobenzene Peptides J. Wachtveitl, S. Spörlein, W. Zinth, C. Renner, R. Behrendt, and L. Moroder .	695
Index of Contributors	699

Ultrafast Phenomena XII

Proceedings of the 12th International Conference,
Charleston, SC, USA, July 9-13, 2000

Elsaesser, T.; Mukamel, S.; Murnane, M.M.; Scherer,
N.F. (Eds.)

2001, XXIII, 707 p., Hardcover

ISBN: 978-3-540-41211-3