

## Intense Attosecond Pulse Research Team

### Publications (Original Paper)

1. Y. Nabekawa, T. Shimizu, T. Okino, K. Furusawa, H. Hasegawa, K. Yamanouchi, and K. Midorikawa, "Conclusive evidence of attosecond pulse train observed with mode-resolved autocorrelation technique", *Phys. Rev. Lett.* (in press).
2. K. Furusawa, T. Okino, T. Shimizu, H. Hasegawa, Y. Nabekawa, K. Yamanouchi, and K. Midorikawa, "Photoelectron spectroscopy of two-photon ionization of rare-gas atoms by multiple high order harmonics pulses", *Appl. Phys. B* (in press).
3. K. Hoshina, A. Hishikawa, K. Kato, T. Sako, K. Yamanouchi, E. J. Takahashi, Y. Nabekawa, and K. Midorikawa, "Dissociative ATI of H<sub>2</sub> and D<sub>2</sub> in intense soft x-ray laser fields", *J. Phys. B* **39**, 813-829 (2006).
4. H. Mashiko, A. Suda, and K. Midorikawa, "Focusing multiple high-order harmonics in the extreme-ultraviolet and soft-x-ray regions by a platinum-coated ellipsoidal mirror", *Appl. Opt.* **45**, 573 (2006).
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9. K. Ishikawa and K. Midorikawa, "Above-threshold double ionization of helium with attosecond intense soft x-ray pulses", *Phys. Rev. A* **72**, 013407 (2005).
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13. A. Hishikawa, M. Ueyama, K. Yamanouchi, "Probing the ultrafast nuclear motion in CS<sub>2</sub><sup>2+</sup> in intense laser fields", *J. Chem. Phys.* **122**, 151104 (2005).
14. Y. Furukawa, K. Hoshina, K. Yamanouchi, H. Nakano, "Ejection of triatomic hydrogen molecular ion from methanol in intense laser fields", *Chem. Phys. Lett.* **414**, 117-121 (2005).
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31. K. Obata, K. Sugioka, K. Midorikawa, T. Inamura, and H. Takai, “Deep etching of epitaxial gallium nitride film by multiwavelength excitation process using  $\text{F}_2$  and KrF excimer lasers”, Appl. Phys. **A82**, 479-483 (2006).
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33. 林偉民, 尹韶輝, 大森整, 上原嘉宏, 鈴木亨: ” ELID 研削と磁性流体研磨 (MRF) を相乗した超精密仕上げ加工プロセスによるシリコンミラーの製作 ”, 砥粒加工学会誌, 49(2005), 701-702.

#### Invited talk

1. K. Furusawa, T. Okino, T. Shimizu, H. Hasegawa, Y. Nabekawa, K. Yamanouchi, and K. Midorikawa, “Two photon ionization of rare-gas atoms in xuv and its applications to the autocorrelation measurement of an attosecond pulse train”, Second Asian Symposium on Intense Laser Science, Kochi, India, Jan. 2006.
2. 緑川克美, “ エクストリームフォトンクス研究 ”, レーザー学会第 342 回研究会「レーザー生成極端紫外光源」, 宮崎, 12 月, 2005.
3. K. Midorikawa and Y. Nabekawa, “Nonlinear multiphoton process in the soft x-ray region by high harmonics”, 2005 Int. Chem. Cong. of Pacific Basin Society (PACIFICHEM 2005), Hawaii, Dec. 2005.
4. 緑川克美, “ 超高速 X 線レーザーの開発とその応用 ”, 電気学会群馬支所講演会, 桐生, 11 月, 2005.
5. K. Midorikawa, “Multiphoton processes with XUV photons and their application to autocorrelation measurement”, 10th Int. Conf. on Multiphoton Processes, Quebec, Canada, Oct. 2005.
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7. K. Midorikawa, “Nonlinear Multiphoton Processes in the Soft X-Ray Region”, CEATEC JAPAN 2005, Makuhari, Japan, Oct. 2005.
8. K. Midorikawa, “Nonlinear multiphoton processes in the soft x-ray region by high harmonics”, Int. Workshop on Intense Laser-Matter Interaction and Pulse Propagation”, Dresden, Germany, Aug. 2005.
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10. Y. Nabekawa, “Multiphoton process by high-order harmonics”, Int. Quantum Elec. Conf. 2005, Tokyo, Japan, Sept. 2005.
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12. K. Midorikawa, “Nonlinear optics in the soft x-ray region”, 平成 17 年度日本分光学会シンポジウム, 東京, 5 月, 2005.
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14. K. Yamanouchi, "Ultrafast hydrogen atom dynamics of small hydrocarbon molecules in intense laser fields", The 2nd Asian Symposium on Intense Laser Science (ASILS2), Kochi, India, January 22-27 (2006).

15. K. Yamanouchi, "Ultrafast Hydrogen Atom Dynamics in Hydrocarbon Molecules in Intense Laser Fields", International Seminar on Progress and Excitement in AMO Physics (ISAMOP), University of Electro-Communications, Chofu, Tokyo, Japan, January 17-18 (2006).
16. K. Yamanouchi, "Structural deformation and hydrogen migration of molecules in intense laser fields", in Symposium on Chemistry with Ultrashort Intense Laser Pulses: The Next Frontier, Honolulu, Hawaii, December 18 (2005).
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20. K. Yamanouchi, "Control of molecules and clusters in intense laser fields: Skeletal bond breaking and hydrogen migration", The Joint Conference on Ultrafast Optics V and Applications of High Field and Short Wavelength Sources XI, Nara, Japan, September 25-30 (2005).
21. K. Yamanouchi, "Ultrafast dynamics of hydrocarbon molecules in intense laser fields: skeletal bond breaking, ejection of triatomic-hydrogen molecular ions and hydrogen-atom migration", Third International Conference on Superstrong Fields in Plasmas, Villa Monastero, Varenna, Italy, September 19-24 (2005).
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25. 山内 薫、「強光子場における分子制御」, 「同位体分離のための分子制御技術」研究会、原研関西研、2006年2月20日、日本原子力研究開発機構 関西光科学研究所、京都
26. 山内 薫、「強光子場科学のフロンティア - 分子は強光子場の下でどのように振舞うか?」, 豊田中央研究所講演会、2006年2月15日、豊田中央研究所、豊田
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30. 歸家令果、「Pendular 状態の実効ハミルトニアン の導出と実験的検証」、日本分光学会春季講演会 日本分光学会奨励賞記念講演、2005 年 5 月 10 日、東京工業大学
31. 須田亮, 緑川克美, “コヒーレント軟 X 線の生成と X 線非線形光学”, 第 8 回 X 線結像光学シンポジウム, 神戸, 2005 年 12 月.
32. H. Hirayama, and Y. Aoyagi, "Quaternary InAlGa<sub>N</sub> based Deep UV LED with High-Al-content p-type AlGa<sub>N</sub>", SPIE-Photonic West, Optoelectronics 2004, Widebandgap UV Semiconductor Devices and Related Topics, 5359-64, San Jose, USA, Jan. 2004.
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34. 平山秀樹: NEC 基幹技術フォーラム、2005 年 6 月 17 日、NEC 関西、大津、「InAlGa<sub>N</sub> 4 元混晶を用いた 300nm 帯紫外 LED の開発」
35. 石橋幸治: “カーボンナノチューブがもたらす半導体の未来”、第 71 回 VLSI FORUM 「新規半導体材料とビジネスの可能性」- 世界をリードする日本の最新材料開発状況-、東京、平成 17 年 11 月 17 日
36. K. Sugioka, "Fs Laser Processes for Precise Nanostructuring and Nanomachining", NATO Advanced Study Institute (ASI) on Photon-based Nanoscience and Technology, Orford, Canada, Sept. (2005).
37. K. Sugioka, Y. Cheng, and K. Midorikawa, "3-D integration of microfluidics and microoptics by femtosecond laser for Lab-on-a-chip applicatio", 11th Int. Conf. on Laser-Assisted Micro- and Nanotechnologies (LAMN-XI) in Conf. on Lasers, Applications, and Technologies (LAT-2005), St. Petersburg, Russia, May (2005).
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40. K. Sugioka, “Laser-assisted Manufacturing Machine Vision”, SPIE Photonics Europe 2006: Symposium on Strategic Technologies for Photonics, Strasbourg, France, April (2006).
41. K. Sugioka, Y. Hanada, and K. Midorikawa, " Laser-induced plasma-assisted ablation (LIPAA): Fundamentals and industrial applications”, SPIE Int. Symp. on High-Power Laser Ablation 2006, Taos, USA, May, (2006).
42. K. Sugioka and K. Midorikawa, " 3D integration of microcomponents in a single glass chip by femtosecond laser direct writing for biochemical analysis", 5th Int. Conf. on Photo-Excited Processes and Applications (5-ICPEPA), Charlottesville, USA, Sept. (2006).
43. 杉岡幸次, “レーザープロセッシングのバイオ・化学マイクロチップへの応用”, 応用物理学会九州支部特別講演会、12 月、福岡 (2005).
44. 杉岡幸次, “レーザーによる光学ガラスの精密微細加工技術”, 技術情報協会セミナー「光学ガラスにおける精密微細加工および欧州指令対策」, 10 月、東京 (2005).

45. 杉岡幸次, ”レーザーマイクロ・ナノプロセッシング”, 情報機構セミナー、4月、東京 (2006).

### 総説・著書等

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2. 緑川克美、フェムト秒高強度軟X線パルスの発生と応用、”フェムト秒テクノロジー“ 化学同人、pp. 322-327, 2005
3. 須田亮, 緑川克美, “極超短パルスレーザーを用いた軟X線発生とその応用”, 光アライアンス, vol. 17, No. 3, pp. 4-8, 2006.
4. 緑川克美、強光子場科学研究分野の現況(1), “強光子場科学の最前線1”, 強光子場科学懇談会、pp.139-148, 2005.
5. 緑川克美、高次高調波とその応用、“光科学研究の最前線”、「光科学研究の最前線」編集委員会、pp. 82-83, 2005.
6. 緑川克美(訳)、“極限的非線形光学: コヒーレント軟X線の発生”、パリティ 21, pp. 4-12 (2006).
7. 大森 整, 林 偉民, 渡邊 裕, 上原 嘉宏, 鈴木 亨, 尹 韶輝: “磁性流体研磨法によるレンズ金型材の仕上げ加工 ELIDとMRFの融合連携の提案”, ツールエンジニア, 45, 9 (2004) 172-178.
8. 大森 整, 林 偉民, 森田晋也, 上原嘉宏, 渡邊 裕, 片平和俊: “究極のELIDアプリケーションを目指して ナノプレシジョン化とマルチプロセス技術”, 機械技術, 52, 9 (2004) 22-25.

### Conferences

1. K. Midorikawa and S. Watanabe, Joint Conference on Ultrafast Optics V and Applications of High Field and Short Wavelength Sources XI, Nara, Japan, Sept. 2005
2. 緑川克美(実行委員長)、レーザー学会学術講演会第26回年次大会、大宮、1月、2005
3. 緑川克美, 理研・分子研合同シンポジウム「エクストリームフォトンクス」、和光、4月、2005.
4. A. Becker and K. Yamanouchi, “International Symposium on Ultrafast Intense Laser Science 4”, December 11-14 (2005), Big Island, Hawaii.
5. H. Kono and K. Yamanouchi, One-day COAST Symposium, “International Symposium on Ultrafast Phenomena of Atoms, Molecules and Bio-molecules in Designed Laser Fields”, July 9 (2005), Tokyo, Japan.
6. 松島房和, 山内 薫, 渡辺信一, ”International Seminar on Progress and Excitement in AMO Physics”「原子・分子・光物理の目覚しい進展」、1月17-18日 (2006)
7. 柳下 明, 東 俊行, 大森賢治, 金森英人, 久我隆弘, 松尾由賀利, 山内 薫, 渡辺信一, 「第2回AMO討論会」、6月18-19日 (2005)
8. K. Sugioka (Co-Chair), 6th Int. Sym. on Laser Precision Microfabrication (LPM 2005), Williamsburg, USA, April (2004).

9. K. Sugioka (Co-Chair ), 4th Int. Congress on Laser Advanced Materials Processing (LAMP2006), Kyoto, Japan, May (2006).
10. K. Sugioka (Co-Chair ), 9th Int. Conf. on Laser Ablation (COLA'07), Teneriffe, Spain, Sept. (2007).
11. K. Sugioka (Co-Chair ), 11th Int. Conf. on Laser-Assisted Micro- and Nanotechnologies (LAMN-XI) in Conf. on Lasers, Applications, and Technologies (LAT-2005), St. Petersburg, Russia, May (2005).

#### **Awards**

1. 歸家令果、日本分光学会奨励賞、「Pendular状態の実効ハミルトニアンの導出と実験的検証」、2005年5月
2. 平山秀樹、文部科学大臣表彰若手科学者賞「半導体光デバイス工学分野における紫外LEDの研究」、2005年4月20日