



## **LI, CHUN-BIU**

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### **ACADEMIC POSITIONS**

***Associate Professor** 2008(March)-present, Research Institute for Electronic Science, Hokkaido Univ.; Department of Mathematics, Hokkaido Univ., Japan*

Research Area: Nonlinear time series analysis, single molecule biophysics, non-equilibrium statistical physics, foundation of reaction theory

***JST/CREST Research Fellow** 2005-2008, Kobe Univ. & Research Institute for Electronic Science, Hokkaido Univ., Japan*

Research Area: Nonlinear time series analysis, single molecule biophysics, foundation of reaction theory

***Postdoctoral Research Fellow** 2004-2005, Kobe Univ., Japan*

Research Area: Foundation of reaction theory

***Visiting Scientist** 2003-2004, Ilya Prigogine Center for Statistical Mechanics and Complex Systems, Univ. of Texas at Austin, USA*

Research Area: Non-equilibrium statistical physics

### **EDUCATION**

***Ph.D. in Physics** 1997-2003, Univ. of Texas at Austin, USA (supervisor: Ilya Prigogine)*

Research Area: Non-equilibrium statistical physics

***M.S. in Physics** 1995-1997, Univ. of Utah, USA*

Research Area: Particle physics, statistical physics

***B.S. in Physics** 1991-1995, Chinese Univ. of Hong Kong*

### **PUBLICATIONS (peer-reviewed)**

1. L. Hong, M. Dumond, S. Tsugawa, A. Sapala, A.L. Routier-Kierzkowska, Y. Zhou, C. Chen, R.S. Smith, T. Komatsuzaki, C.B. Li, A. Boudaoud, A.H.K. Roeder, "Reactive oxygen species

regulate the precision of organ size from variable cellular growth in *Arabidopsis*”, **Cell**, under review (2016)

2. S. Tsugawa, N. Hervieux, O. Hamant, A. Boudaoud, R.S. Smith, C.B. Li, T. Komatsuzaki, “Extracting subcellular fibrillar alignment with error estimation: Application to microtubules”, **Biophys. J.**, 110, 1 (2016)
3. C.B. Li, H. Ueno, R. Watanabe, H. Noji, T. Komatsuzaki, “ATP Hydrolysis Assists Phosphate Release and Promotes Reaction Ordering in F<sub>1</sub>-ATPase”, **Nat. Commun.**, 6, 10223 (2015)
4. C.B. Li, “Challenges in Constructing State-Space Network Models for Complex Systems at the Single Molecule Level”, **Advances in Science, Technology and Environmentology**, Special issue on New Challenges in Complex Systems Science, B11, 51 (2015)
5. J.N. Taylor, C.B. Li, D.R. Cooper, C.F. Landes, T. Komatsuzaki, “Error-based Extraction of States and Energy Landscapes from Experimental Single-Molecule Time-Series”, **Sci. Rep.**, 5, 9174 (2015)
6. P. Nag, H. Teramoto, C.B. Li, J. Terdik, N. Scherer, T. Komatsuzaki, “Local-heterogeneous Response and Transient Dynamics of Cage Breaking and Formation in Colloidal Fluids”, **J. Chem. Phys.**, 141, 104907 (2014)
7. B. Shuang, D.R. Cooper, J.N. Taylor, L. Kisley, J. Chen, W. Wang, C.B. Li, T. Komatsuzaki, C.F. Landes, “Fast Step Transition and State Identification (STaSI) for Discrete Single-Molecule Data Analysis”, **J. Phys. Chem. Lett.**, 5, 3157 (2014)
8. C.B. Li, T. Komatsuzaki, “Handling Noisy Data from Single Molecule Experiments”, **Biophysics**, 54, 257 (2014)
9. T. Sultana, H. Takagi, M. Morimatsu, H. Teramoto, C.B. Li, Y. Sako, T. Komatsuzaki, “Non-Markovian properties and multiscale Hidden Markovian Network Buried in Single Molecule Time Series”, **J. Chem. Phys.**, 139, 245101 (2013)
10. Y. Matsunaga, A. Baba, C.B. Li, J. Straub, M. Toda, T. Komatsuzaki, and S.R. Berry, “Spatio-temporal Hierarchy in the Dynamics of a Minimalist Protein Model”, **J. Chem. Phys.**, 139, 215101 (2013)
11. Y. Nagahata, H. Teramoto, C.B. Li, S. Kawai, T. Komatsuzaki, “Reactivity Boundaries for Chemical Reactions Associated with Higher-Index and Multiple Saddles”, **Phys. Rev. E**, 88, 042923 (2013)
12. C.B. Li, T. Komatsuzaki, “Aggregated Markov Model Using Time Series of Single Molecule Dwell Times with Minimum Excessive Information”, **Phys. Rev. Lett.**, 111, 058301 (2013)
13. Y. Nagahata, H. Teramoto, C.B. Li, S. Kawai, T. Komatsuzaki, “Reactivity Boundaries to Separate the Fate of a Chemical Reaction Associated with an Index-two Saddle”, **Phys. Rev. E**, 87, 062817 (2013)
14. T.G. Terentyeva, J. Hofkens, T. Komatsuzaki, K. Blank, C.B. Li, “Time-Resolved Single Molecule Fluorescence Spectroscopy of an  $\alpha$ -Chymotrypsin Catalyzed Reaction”, **J. Phys. Chem. B**, 117, 1252 (2013)

15. T.G. Terentyeva, H. Engelkamp, A.E. Rowan, T. Komatsuzaki, J. Hofkens, C.B. Li, K. Blank, “Dynamic disorder in single-enzyme experiments: Facts and artifacts”, **ACS Nano**, 6, 346 (2012). This work was highlighted in “In Nano” in the January issue of ACS Nano (2012)
16. N. Miyagawa, H. Teramoto, C.B. Li, T. Komatsuzaki, “Decomposability of Multivariate Interactions”, **Complex Systems**, 20, 165 (2011)
17. N. Miyagawa, H. Teramoto, C.B. Li, T. Komatsuzaki, “Spatial Heterogeneity of Multivariate Dependence”, **AIP Conf. Proc.** “International Conference of Numerical Analysis and Applied Mathematics”, 1389, 991 (2011)
18. T. Komatsuzaki, C.B. Li, S. Kawai, “Robustness and Diversity of Transitions in a Sea of Chaos and Stochastic Fluctuation”, **AIP Conf. Proc.** “International Conference of Numerical Analysis and Applied Mathematics”, 1281, 1582 (2010)
19. T. Komatsuzaki, C.B. Li, A. Baba, “Extracting Complex Network and Effective Free Energy Landscape of Protein Fluctuation from Single-Molecule Time Series”, **Biophys. J.**, 98, Supplement 1, 184a (2010)
20. Y. Matsunaga, C.B. Li, T. Komatsuzaki, “Collectivity at Different Space and Time Scales in Multiscale Protein Dynamics”, **Phys. Rev. E**, 82, 016213 (2010)
21. C.B. Li, H. Yang, T. Komatsuzaki, “A New Quantification of Local Transition Heterogeneity of Multiscale Complex Networks Constructed from Single-Molecule Time Series”, **J. Phys. Chem. B**, 113, 14732 (2009)
22. C.B. Li, M. Toda, and T. Komatsuzaki, “Bifurcation of Transition States in Many-Degrees of Freedom Chemical Reactions”, **J. Chem. Phys.**, 130, 124116 (2009)
23. C.B. Li, H. Yang, T. Komatsuzaki, “Multiscale Complex Network of Protein Conformational Fluctuation in Single-molecule Time Series”, **Proc. Natl. Acad. Sci. USA**, 105, 536 (2008)
24. A. Shojiguchi, C.B. Li, T. Komatsuzaki, and M. Toda, “Dynamical Foundation and Limitations of Statistical Reaction Theory”, **Commun. in Nonlinear Sci. and Numer. Simul.**, 13, 857 (2008)
25. Y. Matsunaga, C.B. Li, T. Komatsuzaki, “Anomalous Diffusion in Folding Dynamics on Minimalist Protein Landscape”, **Phys. Rev. Lett.**, 99, 238103 (2007)
26. A. Shojiguchi, C.B. Li, T. Komatsuzaki, M. Toda, “Fractional Behavior in Multi-Dimensional Hamiltonian Systems Describing Reactions”, **Phys. Rev. E**, 76, 056205 (2007)
27. A. Shojiguchi, C.B. Li, T. Komatsuzaki, M. Toda, “Fractional behavior in nonergodic reaction processes of isomerization”, **Phys. Rev. E (rapid communication)**, 75, 035204(R) (2007)
28. S. Kawai, Y. Fujimura, O. Kajimoto, T. Yamashita, C.B. Li, T. Komatsuzaki, and M. Toda, “Dimension reduction for extracting geometrical structure of multidimensional phase space: Application to fast energy exchange in the reaction  $O(^1D)+N_2O \rightarrow NO+NO$ ”, **Phys. Rev. A**, 75, 022714 (2007)

29. G.J. Rylance, R.L. Johnston, Y. Matsunaga, C.B. Li, A. Baba, T. Komatsuzaki, "Topographical complexity of multidimensional energy landscapes", **Proc. Natl. Acad. Sci. USA**, 103, 18551 (2006)
30. A. Shojiguchi, A. Baba, C.B. Li, T. Komatsuzaki, and M. Toda, "Wavelet Analysis and Arnold Web Picture for Detecting Energy Transfer in Hamiltonian Dynamical System", **Laser Phys.**, 16(7), 1097 (2006)
31. C.B. Li, M. Toda, T. Komatsuzaki, "Geometrical Structure buried in the Phase Space of Stochastic Structural Transition", **Bussei Kenkyu (Kyoto)**, 86, 77 (2006)
32. C.B. Li, A. Shojiguchi, M. Toda, T. Komatsuzaki, "Definability of No-return Transition States in High Energy Regime above Threshold", **Phys. Rev. Lett.**, 97, 028302 (2006)
33. C.B. Li, A. Shojiguchi, M. Toda, T. Komatsuzaki, "Dynamical Hierarchy in Transition States of Reactions", **Few-Body Systems**, 38, 173 (2006)
34. C.B. Li, Y. Matsunaga, M. Toda, T. Komatsuzaki, "Phase Space Reaction Network on a Multisaddle Energy Landscape: HCN isomerization", **J. Chem. Phys.** 123, 184301 (2005)
35. C.B. Li, M. Toda, T. Komatsuzaki, "Chaotic Reaction Dynamics and the Phase Space Geometry of Multidimensional Chemical Reaction", **Bussei Kenkyu (Kyoto)**, 84-3, 481 (2005)
36. C.B. Li, D.J. Driebe, T. Petrosky, "Resonance overlap, secular effects, and nonintegrability: An approach from ensemble theory", **Phys. Rev. E**, 69, 066120 (2004)
37. H.H. Hasegawa, C.B. Li, Y. Ohtaki, "Thermodynamics of a system with long-time correlations", **Intl. J. Quantum Chem.**, 98, 138 (2004)
38. H.H. Hasegawa, D.J. Driebe, C.B. Li, "Spectral decomposition of the stretching dynamics of the Arnold cat map", **Phys. Lett. A**, 319, 290 (2003)
39. H.H. Hasegawa, C.B. Li, Y. Ohtaki, "Fractional power scaling of excess heat production", **Phys. Lett. A**, 307, 222 (2003)
40. C.B. Li, D. C. Mattis, " $t$ - $J$  Model with infinite-ranged hopping", **Mod. Phys. Lett. B**, 11, 115 (1997)
41. J. Baker, C.B. Li, "The two-phase approximation for black hole collision: is it robust?", **Classical and Quant. Grav.**, 14, L77 (1997)
42. C.F. Lo, T.Y. Liu, C.B. Li, "Squeezing properties of a pulsating oscillator", **Quantum Semiclass. Opt.**, 7, 843 (1995)

## **BOOKS/CHAPTERS**

1. C.B. Li, T. Komatsuzaki, "Extracting the Underlying Unique Reaction Scheme from a Single-Molecule Time Series", **Cell Signaling Reactions: Single-Molecular Kinetic Analysis**, Springer, (2010).

2. S. Kawai, H. Teramoto, C.B. Li, T. Komatsuzaki, M. Toda, “Dynamical Reaction Theory based on Geometric Structures of Phase Space”, **Adv. Chem. Phys.**, Vol. 145, ed. by R.S. Berry, D.M. Leitner, T. Komatsuzaki, John-Wiley & Sons, Inc. (2011).
3. D.M. Leitner, Y. Matsunaga, A. Shojiguchi, C.B. Li, T. Komatsuzaki, M. Toda, “Non-Brownian Phase Space Dynamics of Molecules, the Nature of their Vibrational States, and non-RRKM Kinetics”, **Adv. Chem. Phys.**, Vol. 145, ed. by R.S. Berry, D.M. Leitner, T. Komatsuzaki, John-Wiley & Sons, Inc. (2011).

## **HONORS AND SERVICES**

***Departmental Achievement Award*** from Research Institute for Electronic Science, Hokkaido Univ. (2015)

***Advisory Board Member*** for Biophysical Society of Japan (from 2015)

***Program Grant Award*** from Human Frontier Science Program (2013-2016)

***Professional Development Award*** from the Univ. of Texas at Austin (2003)

***Summer Research Fellowship*** from Ilya Prigogine Center for Studies in Statistical Mechanics and Complex Systems, Univ. of Texas at Austin (2001-2003)

***National Dean's List*** for America's outstanding college students (1997-1998)

## **INVITED TALKS & ORGANIZED SYMPOSIA**

1. “From Single Molecule Time Series to Networks and Dynamics: Approaches from Information Theory”, **invited talk**, Conference on the Time in Biological Systems and Beyond, National Center of Theoretical Science, Taiwan (2016.3.28-29)
2. “Time Series, Networks and Dynamics: Constructing Hidden Markov Model from Information Theory”, **invited talk**, Computation Chemistry and Biology Seminar, Department of Chemistry, Hong Kong Univ. of Sci. and Tech., Hong Kong (2016.2.22)
3. “The Key and Unlock Mechanisms in F<sub>1</sub>-ATPase Unveiled by Single Molecule Time Series Analysis”, **invited talk**, the 4th Workshop on Molecular & Chemical Kinetics, Berlin, Germany (2015.9.7-9)
4. “Searching for New Mathematical Frameworks to Understand Complex Systems in the Real World”, **invited talk**, Cross-border Forum of “Money problems, Job market, and Chaos: mathematical and economical perspective on distribution of value from a viewpoint of Italy's and Japan's Economy”, Hokkaido Univ., Japan (2015.7.29)
5. “Detection of Time Dependent Causality: An Information-theoretic Approach”, **invited talk**, Dynamical System Seminar, Math. Department, Hokkaido Univ., Japan (2015.7.14)
6. “The Roles of ATP Hydrolysis Revealed by Single Molecule Time Series Analysis of Rotary Fluctuations in F<sub>1</sub>-ATPase”, **invited talk**, Telluride Workshop on “The Complexity of Dynamics and Kinetics from Single Molecules to Cells”, Telluride, USA (2015.6.14-6.18)

7. “Robust Construction of Dwell-Time Statistics from Experimental and Simulation Time Series”, **invited talk**, Max Planck Institute of Colloids and Interfaces, Potsdam, Germany (2015.4.17)
8. “Time Series, Networks and Dynamics: Constructing Hidden Markov Model from Information Theory”, **invited talk**, Department of Mathematics, Computer Science and Bioinformatics, Free University of Berlin, Germany (2015.4.14)
9. “Single Molecule Time Series Analysis of F1-ATPase to Unravel the Role of ATP Hydrolysis and Thermal Fluctuations”, **invited talk**, Max Planck Institute of Colloids and Interfaces, Potsdam, Germany (2015.1.7)
10. “Challenges in Understanding Complex Systems at the Single Molecule Level”, **invited talk**, Waseda AICS Symposium and the 14th Slovenia-Japan Seminar “New Challenges in Complex Systems Science”, Waseda University, Tokyo, Japan (2014.10.24-26)
11. “Single Molecule Time Series Analysis of Supermolecular Motor Proteins”, **invited talk**, Computational Science and Engineering Lab., ETH, Zurich, Switzerland (2014.9.2)
12. “Time Series, Networks and Dynamics: A Perspective from the Information Theory”, **invited talk**, the 14<sup>th</sup> RIES-Hokudai International Symposium, Sapporo, Japan (2013.12.11-12)
13. International Workshop on Quantitative Biology, **organizer**, Osaka, Japan (2013.11.25)
14. “Inferring Kinetics Objectively from Single Molecule Time Series with Full Information Content”, **invited talk**, 51<sup>th</sup> annual meeting of the Biophysical Society of Japan, Kiyoto, Japan (2013.10.28-30)
15. “The Hidden Markov Modeling with Exact Information Content of Dwell-Time Time Series”, **invited talk**, Complexity Sciences Center, Physics Department, Univ. of California, Davis, USA (2013.9.17)
16. “When Computational Mechanics Meets Single Molecule Time Series”, **invited talk**, in the 2013 International Symposium on Nonlinear Theory and its Applications (NOLTA 2013), Santa Fe, USA (2013.9.11)
17. Telluride Workshop on “The Complexity of Dynamics and Kinetics in Many Dimensions”, **organizer** (with Tamiki Komatsuzaki and Stephen Berry), Telluride, USA (2013.6.16-20).
18. “Does Dynamic Disorder Exist in the Enzymatic Reactions on the Single Molecule Level?”, **invited talk**, Department of Chemistry, Rice Univ., USA (2013.3.21).
19. “Modeling Single Molecule Kinetics Objectively from Dwell-time Time Series”, **invited talk**, in International Workshop on Quantitative Biology, Univ. of Tokyo, Japan (2012.11.22)
20. “Toward the Decoding of Single Nucleotides Tunneling Current by Change Point Analysis”, **invited talk**, the Institute of Scientific and Industrial Research, Osaka Univ., Japan (2012.11.14)

21. “How to Uncover Hidden Statistical Features from Noisy Single Molecule Time Series?”, **invited talk**, in G3 Meeting International with the Japanese nano-macro materials, devices and system research alliance, Tokyo Institute of Technology, Japan (2012.10.11-12)
22. Symposium of “The Art of Energetic and Functional Efficiency in Biomolecular Machines on the Single Molecule Level”, **organizer**, in the 50<sup>th</sup> annual meeting of the Biophysical Society of Japan, Nagoya, Japan (2012.9.22-24)
23. “Data-driven Modeling of Single Molecule Kinetics from Dwell-time Time Series”, **invited talk**, Institute for Molecules and Materials, Radboud University Nijmegen, the Netherlands (2012.4.25)
24. “Dynamic disorder in single-enzyme experiments: Facts and artifacts”, **invited talk**, Institute of Biochemistry, University of Muenster, Germany (2012.4.24)
25. “An Information Theoretic Approach to Dynamical Irreversibility from Time Series”, **invited talk**, in the symposium of “Dynamics of complex systems 2012”, Mathematics department, Hokkaido Univ., Japan (2012.3.6-8).
26. “Single Molecule Time Series Analysis of Supermolecular Motor Proteins”, **invited talk**, in Telluride Workshop on “Single Molecule Dynamics”, Telluride, USA (2011.6.27-7.1).
27. Telluride Workshop on “The Complexity of Dynamics and Kinetics in Many Dimensions”, **organizer** (with Tamiki Komatsuzaki and Stephen Berry), Telluride, USA (2011.6.20-24).
28. “Data-driven Modeling of Single Molecule Experiments from Time Series Analysis”, **invited talk**, Department of Chemistry, Rice Univ., USA (2011.6.17).
29. “The Hidden Markov Modeling with Exact Information Content of Dwell-Time Time Series”, **invited talk**, in the symposium of “Dynamics of complex systems 2011”, Mathematics department, Hokkaido Univ., Japan (2011.3.7-9).
30. “When One Plus One is More Than Two: Theoretical Challenges in Learning from the Next Generation Single- and Multiple-molecule Experiments”, **organizer**, in the symposium of “Bridging Single Molecule Biophysics and System Biology: New Experimental and Theoretical Challenges”, 48<sup>th</sup> annual meeting of the Biophysical Society of Japan, Sendai, Japan (2010.9.20-22)
31. “Single Molecule Time Series Analysis of Supermolecular Motor Proteins”, **invited talk**, Institute for Molecules and Materials, Radboud University Nijmegen, the Netherlands (2010.8.3)
32. “Time-dependent Perturbation Analysis of Small Nonintegrable Hamiltonian System”, **invited talk**, Dynamics of Complex Systems Seminar, Department of Mathematics, Hokkaido Univ., Japan (2010.6.9)
33. “Transition to Chaos above the Reaction Threshold: Bifurcations, Resonances and Future Challenges”, **invited talk**, Workshop on Dynamical System Theory and Reaction Dynamics toward Large Systems, Kyoto University, Japan (2010.1.5-6)

34. “A Handy Guide to Analyze Time Series from Biological Systems: Some Simple but Powerful Tools”, **invited talk**, Graduate student seminar, University of Fukui, Faculty of Medical Science, Japan (2009.12.15)
35. “What is the Relevant Information in Modeling the Dynamics of Complex Systems from Measurements”, **invited talk**, in the symposium of “Dynamics of complex systems 2009”, Mathematics department, Hokkaido Univ., Japan (2009.8.31-9.2).
36. Telluride Workshop on “The Complexity of Dynamics and Kinetics in Many Dimensions”, **organizer** (with Tamiki Komatsuzaki and Stephen Berry), Telluride, USA (2009.6.29-7.3).
37. “Data-driven modeling of Biological Systems: An information-theoretic approach”, **invited talk**, the 4<sup>th</sup> Bioinformatics colloquium at Hokkaido, Frontier Research Center for Post-genomic Science and Technology, Hokkaido Univ., Japan (2009.3.24).
38. “Data-driven modeling of single molecule experiments from time series analysis”, **invited talk**, Laboratory for photochemistry and spectroscopy, department of chemistry, Katholieke Universiteit Leuven, Belgium (2009.2.20).
39. “Complex multiscale networks of protein fluctuation dynamics from single molecule time series”, **invited talk**, the 6<sup>th</sup> Asian Biophysics Association (ABA) Symposium and 27<sup>th</sup> Hong Kong Society of Neuroscience (HKSN) Annual Meeting, Hong Kong Univ. of Science and Technology, Hong Kong (2009.1.11-14).
40. “Data-driven modeling of single mechanosensitive Ion channels from time series analysis”, **invited talk**, in the symposium of “New approaches to complexity of protein dynamics by single molecule measurements: Experiments and theories”, Institute of Protein Research, Osaka Univ., Japan (2008.12.7-9).
41. “Understanding the multiscale dynamics of complex biological systems from single molecule experiments”, **invited talk**, in the symposium of “Drug discovery based on the rare events occurring on protein”, 46<sup>th</sup> annual meeting of the Biophysical Society of Japan, Fukuoka, Japan (2008.12.3-5)
42. “On the search of new mathematical frameworks to unveil the multiscale dynamics of complex systems”, **invited talk**, in the symposium of “Interfacial dynamics on the boundaries of physics, chemistry, biology and mathematics”, Hokkaido Univ., Japan (2008.11.20)
43. “An Information-theoretic approach to unveil the multiscale dynamics of biophysical systems: Information flows among different scales”, **invited talk**, in the symposium of “Dynamics of complex systems 2008”, Mathematics department, Hokkaido Univ., Japan (2008.9.1-3).
44. “Mining dynamical information for large-scale protein MD simulation: A geometrical perspective”, **invited talk**, High-performance Molecular Simulation Team, RIKEN, Yokohama, Japan (2007).
45. “The dynamical origin of chemical reactions: How and why system reacts from one state to the others?”, **invited talk**, the 3<sup>rd</sup> Shanghai international symposium on nonlinear sciences and applications, China (2007).



46. "Extracting protein conformation dynamics on a photon-by-photon basis in single molecule experiments", **invited talk**, the 3<sup>rd</sup> Shanghai international symposium on nonlinear sciences and applications, China (2007).
47. "Detection of phase space geometrical structures buried in time series", **invited talk**, in the symposium of "Dynamics of Complex Systems: Mathematical Modeling, Method and Prediction (on the celebration of 60<sup>th</sup> birthday of Profs. Y. Pesin and Y. Takahashi)", Hokkaido Univ., Japan (2007).
48. "Uncovering the phase space geometry of reaction dynamics: Theory and Practice", **invited talk**, Nonlinear Dynamics Group, Tokyo Metropolitan Univ., Japan (2007).
49. "Phase Space Mission in Chemical Reaction Dynamics", **invited talk**, in the symposium of "Cross-Talk between Chemistry and Planetary Sciences II", Kobe Univ., Japan (2006).
50. "Extracting conformation dynamics on a photon-by-photon basis in single-molecule electron transfer experiment", **invited talk**, in the symposium of "Dynamics of protein folding and function", Institute for Protein Research, Osaka Univ., Japan (2006).
51. "How can we extract the underlying dynamics from the time series of Single Molecular experiments", **invited talk**, Kidera's group, Yokohama City Univ., Japan (2006).
52. "Nonequilibrium statistical mechanics of small Hamiltonian systems", **invited talk**, Ohmine's group, Nagoya Univ., Japan (2005).
53. "Origin of Stochastic Transition on Multi-dimensional Energy Landscape", **invited talk**, in Telluride Summer Workshop "Energy Landscapes: Dynamics and Optimization", USA (2005).
54. "Vibrational energy redistribution via geometrical structures in the multi-dimensional phase space of chemical reaction", **invited talk**, in Telluride Summer Workshop "Condensed Phase and Gas Phase Vibrational Dynamics", USA (2005).
55. "Dynamical Hierarchical structures in the multidimensional phase space of chemical reactions", **invited talk**, in Institute of Molecular Science, Okazaki, Japan (2005).