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November 26, 2004

Biocomplexity Faculty Search Committee
c / o Professor Rob de Ruyter van Steveninck
Department of Physics
Indiana University
Swain Hall West 117
Bloomington IN, 47405-7105

Dear Members of the Search Committee,

I am writing to apply for the Biocomplexity faculty position in the College of Arts and Sciences at Indiana University, Bloomington, as advertised on the October 21 issue of Nature. I am a postgraduate researcher at the University of California at San Diego, Department of Physics and Center for Theoretical Biological Physics, where I am working with Professor José N. Onuchic.

My research has been centered on studying the role of protein dynamics on their function through the development of theoretical models and computer simulations. I received my Ph.D. for studies on protein electron transfer reactions under the direction of Professor Nobuhiro Go in Kyoto University. At UCSD, I have been working on the inter-molecular electron transfer reactions in collaboration with Professor Melvin Y. Okamura. In this work, I use full atomic detailed potential to study the binding process of the proteins as well as the effect of conformational dynamics on electron transfer reactions. By combining Professor Okamura's experimental data with my computational results, we have been making progresses toward the understanding of the electron transfer reaction between cytochrome and photosynthetic reaction center.

My research interests are also focused on the development of theoretical framework to describe the energy landscape of allosteric protein conformational changes. In a theory we have developed in collaboration with Professor Peter G. Wolynes, we consider two energy surfaces corresponding to ligand bound and unbound states with different minima. The energy surfaces are extrapolated from each of the steady states (energy minimum) using the normal mode theory with a simplified elastic network model. We proposed in this work a new concept: "cracking", i.e., unlike macroscopic machines, biological machinery can break during ordinary function and still complete its task, and then re-assemble as needed through its folding capabilities.

I intend to continue my work in the biological physics of biomolecular machinery from both theoretical and computational perspectives. In addition, I aim to extend my research toward evolution of protein architecture, since evolution appears as another principle for understanding biomolecular machinery. I believe that with my research experience and interests in theoretical biophysics I am a strong candidate for this position.

Please find enclosed my curriculum vitae, publication list, teaching philosophy and research plans. You will receive the letters of recommendation from professors:

Prof. José N. Onuchic,	University of California at San Diego, Center for Theoretical Biological Physics and Department of Physics, <i>mentor</i>
Prof. Melvin Y. Okamura,	University of California at San Diego Department of Physics, <i>co-mentor</i>
Prof. Nobuhiro Go,	Japan Atomic Energy Research Institute, Japan, <i>Ph.D. advisor</i>
Prof. Peter G. Wolynes,	University of California at San Diego, Center for Theoretical Biological Physics and Department of Physics, Department of Chemistry and Biochemistry, <i>collaborator</i>

I thank you for your consideration and look forward to hearing from you.

Sincerely,

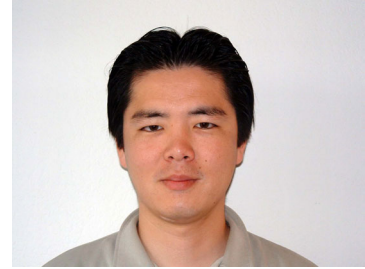


Osamu Miyashita

Curriculum Vitae

Osamu Miyashita

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USA
Tel: 1-858-534-7337
Email: omiyashita@ucsd.edu
Date of Birth: January 7, 1974



EDUCATIONS

November 2000 Kyoto University Graduate School of Science, Kyoto, Japan
Ph. Degree in Science, “Role of Conformational Dynamics on Electron and Energy Transfer in a Protein Molecule”
Supervisor: Prof. Nobuhiro Go
Collaborator: Prof. Akinori Kidera

March 1998 Kyoto University Graduate School of Science, Kyoto, Japan
Master Degree in Science

March 1996 Kyoto University Faculty of Science, Kyoto, Japan
Bachelor Degree in Science

POSTDOCTORAL TRAINING

November 2000 – present Postdoctoral Fellow
University of California at San Diego, Department of Physics
Mentors: Prof. José N. Onuchic
 Prof. Melvin Y. Okamura
Collaborator: Prof. Peter G. Wolynes

PROFESSIONAL EXPERIENCES

November 1999 – October 2000 **President**, Society of Young Biophysical Researchers of Japan

April 1999 – December 1999 **Computer System Administrator**, Kyoto University
Graduate School of Science, Department of Chemistry

September 1998 – March 1999 **Teaching Assistant**, Kyoto University Graduate School of
Science, Department of Chemistry

HONOR, AWARDS

November 2001 – October 2003 Postdoctoral Fellowship of La Jolla Interfaces in Science from
Burroughs Wellcome Fund

January 2000 – October 2001 Research Fellowship for Young Scientists of Japan Society for
the Promotion of Science

July 2001 Travel Fellow Grant: 4th International Conference on Biological
Physics, ICBP2001, Kyoto, Japan

September 1999 Travel Fellow Grant: XIII International Biophysics Congress,
New Delhi, India

PUBLICATION LIST

1. **Osamu Miyashita** and Nobuhiro Go (1999). Pressure dependence of protein electron transfer reactions: theory and simulation. *J. Phys. Chem. B*, 562-571, 103
2. **Osamu Miyashita** and Nobuhiro Go (2000). Reorganization energy of protein electron transfer reaction: study with structural and frequency signature. *J. Phys. Chem. B*, 7516-7521, 104
3. Florence Tama, **Osamu Miyashita**, Akio Kitao and Nobuhiro Go (2000). Molecular dynamics simulation shows large volume fluctuation. *Euro. Biophys. J.*, 472-480, 2
4. Kei Moritsugu, **Osamu Miyashita**, Akinori Kidera (2000). Vibrational energy transfer in a protein molecule. *Phys. Rev. Lett.*, 3970-3973, 85
5. **Osamu Miyashita**, Herbert L. Axelrod, José N. Onuchic (2002). Different scenarios for inter-protein electron tunneling: The effect of water-mediated pathways. *J. Biol. Phys.*, 383-394, 28
6. **Osamu Miyashita**, Melvin Y. Okamura, José N. Onuchic (2003). A theoretical understanding of the inter-protein electron transfer between cytochrome c_2 and the photosynthetic reaction center. *J. Phys. Chem. B*, 1230-1241, 107
7. Kei Moritsugu, **Osamu Miyashita**, Akinori Kidera (2003). Temperature dependence of vibrational energy transfer in a protein molecule. *J. Phys. Chem. B*, 3309-3317, 107
8. **Osamu Miyashita**, José N. Onuchic, Peter G. Wolynes (2003). Nonlinear elasticity, proteinquakes, and the energy landscapes of functional transitions in proteins. *Proc. Natl. Acad. Sci. USA*, 12570-12575, 100
9. **Osamu Miyashita**, José N. Onuchic, Melvin Y. Okamura (2003). Continuum electrostatic model for the binding of cytochrome c_2 to the photosynthetic reaction center from *Rhodobacter sphaeroides*. *Biochemistry*, 11651-11660, 42
10. Florence Tama, **Osamu Miyashita**, Charles L. Brooks III (2004). Flexible multi-scale fitting of atomic structures into low-resolution electron density maps with elastic network normal mode analysis. *J. Mol. Biol.*, 985-999, 337
11. Florence Tama, **Osamu Miyashita**, Charles L. Brooks III (2004). NMFF: Normal Mode based Flexible Fitting of high-resolution structure into low-resolution experimental data from cryo-EM. *J. Struct. Biol.*, 315-326, 147
12. Lilly Wong, Scot Lieser, Barbara Chie-Leon, **Osamu Miyashita**, Brandon Aubol, Jennifer Shaffer, José N. Onuchic, Patricia A. Jennings, Virgil L. Woods Jr., Joseph A. Adams (2004). A single residue provides a dynamic link between the SH2 domain and active site of the COOH terminal Src kinase, Csk. *J. Mol. Biol.*, 93-106, 341
13. **Osamu Miyashita**, Peter G. Wolynes, José N. Onuchic (2004) Simple Energy Landscape Model for the Kinetics of Functional Transitions in Proteins. *J. Phys. Chem. B*, *accepted*
14. **Osamu Miyashita**, José N. Onuchic, Melvin Y. Okamura (2004) Transition State and Encounter Complex for Fast Association of Cytochrome c_2 with Bacterial Reaction Center. *Proc. Natl. Acad. Sci. USA*, 16174-16179, 101

Doctoral Thesis: Osamu Miyashita (2000). Role of conformational dynamics on electron and energy transfer in a protein molecule. PhD thesis, Kyoto University, Kyoto, Japan