

**BIOGRAPHICAL SKETCH**

Provide the following information for the key personnel in the order listed on Form Page 2.  
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Ichiro Matsumura		POSITION TITLE Assistant Professor of Biochemistry	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Massachusetts Institute of Technology	B.S.	1984-88	Molecular Biology
University of California, Berkeley	Ph.D.	1988-95	Biochemistry
University of Texas at Austin	(post-doc)	1995-2000	Chemistry

**A. Positions and Honors.****Positions and Employment**

- 1988-1991 Graduate Student; University of California, Berkeley, Department of Molecular and Cell Biology (Prof. Allan C. Wilson, advisor)
- 1991-1995 Graduate student; University of California, Berkeley, Department of Molecular and Cell Biology (Prof. Jack F. Kirsch, advisor)
- 1995-2000 Post-doctoral fellow; University of Texas at Austin, Department of Chemistry and Biochemistry (Prof. Andrew Ellington, advisor)
- 2000- Assistant Professor; Emory University School of Medicine, Department of Biochemistry

**Other Experience and Professional Memberships**

- 2001 Ad hoc member of NIH BNP Study Section
- 2001- NSF grant reviewer (3)
- 2003 Proposal reviewer for Miller Institute for Basic Research, University of California, Berkeley, CA
- 2003- Biochemistry, Cell and Developmental Biology (BCDB) Graduate Research Program, Emory University Graduate Division, Executive Committee
- 2004 Ad hoc member of NIH BBA Study Section
- 2004 Session Chair, Gordon Research Conference on Biocatalysis

**Honors**

- 1988 National Science Foundation Fellowship, honorable mention
- 1993-1994 National Institutes of Health Bioengineering Trainee
- 1994 White House Fellowship, Regional Finalist
- 1996-1997 Walther Cancer Institute Post-doctoral Research Fellowship
- 1997-1999 National Science Foundation-Alfred P. Sloan Foundation Post-doctoral Research Fellowship in Molecular Evolution

## B. Peer-reviewed publications (in chronological order).

1. Colina KF, Perler FB, Matsumura I, Meda M, Nutman TB. 1990. The identification of an *Onchocerca*-specific recombinant antigen containing a T cell epitope. *Journal of Immunology* **145**(5): 1551-1556.
2. Wedeen CJ, Kostriken RG, Matsumura I, Weisblat DA. 1990 Evidence for a new family of evolutionarily conserved homeobox genes. *Nucleic Acids Research* **18**(7):1908.
3. Lian C, Le H, Montez B, Patterson J, Harrell S, Laws D, Matsumura I, Pearson J, Oldfield E. 1994. A fluorine-19 nuclear magnetic resonance spectroscopic study of fluorophenylalanine and fluorotryptophan-labelled avian egg white lysozymes. *Biochemistry* **33**(17):5238-5245.
4. Matsumura I, Kirsch, JF. 1996 Asparagine 46 and aspartate 52 contribute synergistically to the substrate association and to the catalytic mechanism of chicken egg white lysozyme. *Biochemistry* **35**(6):1890-1896.
5. Matsumura I, Kirsch JF. 1996 Is aspartate 52 essential for catalysis by chicken egg white lysozyme? The role of natural substrate-assisted catalysis. *Biochemistry* **35**(6):1881-1889.
6. Matsumura I, Ellington AD. 1996. DNA shuffling brightens prospects for GFP. *Nature Biotechnology* **14**(3):366.
7. Matsumura I, Ellington AD. 1999. *In vitro* evolution of thermostable p53 variants. *Protein Science* **8**:731-740.
8. Matsumura I, Wallingford JB, Surana NK, Vize PD, Ellington AD. 1999. Directed evolution of the surface chemistry of the reporter enzyme, beta glucuronidase. *Nature Biotechnology* **17**:696-701.
9. Matsumura I, Ellington AD. 2001. *In vitro* evolution of beta-glucuronidase into a beta-galactosidase proceeds through non-specific intermediates. *J. Mol. Biol.* **305**: 331-339.
10. Matsumura I, Olsen, MJ, Ellington AD. 2001. Optimization of heterologous gene expression for *in vitro* evolution. *Biotechniques* **30**:474-475.
11. Rowe LA, Geddie ML, Alexander OB, Matsumura I. 2003. A comparison of directed evolution approaches using the beta-glucuronidase model system. *Journal of Molecular Biology* **332**(4):851-60.
12. Geddie ML, Matsumura I. 2004. Rapid Evolution Of Beta-Glucuronidase Specificity By Saturation Mutagenesis Of An Active-Site Loop. *J. Biol. Chem.* **279**(25):26462-8.
13. Geddie ML, Rowe LA, Alexander OB, Matsumura I. 2004. High throughput microplate screens for directed protein evolution. *Methods Enzymol.* **388**:134-45.
14. Rowe LA, Matsumura I. 2005. Whole circle mutagenic PCR for directed protein evolution. *Biomolec. Eng.* **22**: 73-79.
15. Polizzi KM, Spencer CU, Dubey A, Matsumura, I, Lee JH, Realff MJ, Bommarius AS. 2005. Pooling for Improving Directed Evolution. *J. Biomolec. Screening* (in press).
16. Parikh MR, Matsumura I. 2005. Site-saturation mutagenesis is more efficient than DNA shuffling for the directed evolution of beta-fucosidase from beta-galactosidase. *J. Mol. Biol* (in press).

## C. Research Support

### Ongoing Research Support

NIH/NIGMS (1 R01 GM074264-01) May 1, 2005-April 30, 2010

Title: "Directed evolution to diversify HIV protease function"

Agency: National Institutes of Health Principal Investigator: Ichiro Matsumura

### **Ongoing Research Support (cont.)**

The goal of this project is to direct the evolution of HIV proteases with specificity for proteins associated with rheumatoid arthritis and cancer.

NIH/NIAID (1 R21AI054602-01) May 1, 2003-April 30, 2005

Title: "Engineered alkaline phosphatases as biosensors"

Agency: National Institutes of Health Principal Investigator: Ichiro Matsumura

The goal of this two-year project is to develop high throughput screens to evolve the E. coli alkaline phosphatase into an enzyme biosensor.

NSF CHE/CRC (#0404677) June 1, 2004-May 30, 2008

Title: "Towards synthetic biology: the replication of synthetic polymers"

Agency: National Science Foundation Principal Investigator: David Lynn

The objective of this collaborative project is to create a new type of informational polymer. Our role in this project is to direct the evolution of enzymes that accelerate the polymerization of the polymer.

### **Completed Research Support**

Emory University Research Council September 1, 2000-August 31, 2001

Title: "*In vitro* evolution to redesign an enzyme's specificity"

Agency: Emory University Principal Investigator: Ichiro Matsumura

This internal university grant supported the purchase of our first automated liquid handling instruments.

Emory-Georgia Tech. Biomed. Tech. Res. Center September 1, 2002- August 31, 2003

Title: "Accelerating *In vitro* Protein Evolution"

Agency: Emory University/Georgia Institute of Technology

Principal Investigator: Ichiro Matsumura and Andreas Bommarius

The purpose of this project was to direct the evolution of E. coli beta-glucuronidase variants with altered substrate specificity.

NSF BIO/MCB (#0109668) October 1, 2001-September 30, 2004

Title: "In vitro evolution to diversify an enzyme's specificity"

Agency: National Science Foundation Principal Investigator: Ichiro Matsumura

The objective of this project is to evolve the E. coli beta-glucosidase to utilize several substrate analogues.