Masakazu Iwai

Bioenergetics Department
Molecular Biophysics & Integrated Bioimaging Division
Lawrence Berkeley National Laboratory, Berkeley, USA

431 Koshland Hall (Niyogi lab)
University of California
Berkeley, CA 94720-3102
Office: +1 (510) 642-4034
E-mail: miwai@berkeley.edu
https://masakazuiwai.github.io

Professional Experience

2018-Present	**Research Scientist**, Molecular Biophysics & Integrated Bioimaging Division, Lawrence Berkeley National Laboratory, Berkeley, USA
2015-2018	**Postdoctoral Researcher**, Molecular Biophysics & Integrated Bioimaging Division, Lawrence Berkeley National Laboratory, Berkeley, USA
2012-2015	**Project Researcher**, Precursory Research for Embryonic Science and Technology, Japan Science and Technology Agency, Japan
2009-2012	**Special Postdoctoral Researcher**, Live Cell Molecular Imaging Research Team, RIKEN Advanced Science Institute, Japan

Education

Ph.D.	Life Science, 2009: Hokkaido University, Sapporo, Hokkaido, Japan
M.S.	Environmental Ecology, 2006: Hokkaido University, Sapporo, Hokkaido, Japan
B.S.	Botany, 2003: Humboldt State University, Arcata, CA, USA

Publications

*Corresponding author(s)

27. Lu Y*, Gan Q, **Iwai M**, Alboresi A, Burlacot A, Dautermann O, Takahashi H, Crisanto T, Peltier G, Morosinotto T, Melis A, Niyogi KK* (2021) Role of an ancient light-harvesting protein of PSI in light absorption and photoprotection. ***Nature Communications*** 12: 679. DOI: 10.1038/s41467-021-20967-1

26. **Iwai M***, Chen JJ, Park S, Yoneda Y, Schmid EM, Fletcher DA, Fleming GR, Niyogi KK (2020) Variable optical properties of light-harvesting complex II revisited. ***bioRxiv*** (preprint) DOI:10.1101/2020.10.05.312405

25. Arsenault EA, Yoneda Y, **Iwai M**, Niyogi KK, Fleming GR* (2020) The role of mixed vibronic Q_y-Q_x states in green light absorption of light-harvesting complex II. ***Nature Communications*** 11: 6011. DOI:10.1038/s41467-020-19800-y (*Research Square* DOI:10.21203/rs.3.rs-46465/v1)

24. Onoa B*, Fukuda S, **Iwai M**, Bustamante C, Niyogi KK* (2020) Atomic force microscopy visualizes mobility of photosynthetic proteins in grana thylakoid membranes. ***Biophysical Journal*** 118: 1-11. DOI:10.1016/j.bpj.2020.02.029 (*bioRxiv* DOI:10.1101/426759)

23. Arsenault EA, Yoneda Y, **Iwai M**, Niyogi KK, Fleming GR* (2020) Vibronic mixing enables ultrafast energy flow in light-harvesting complex II. ***Nature Communications*** 11: 1460.

DOI:10.1038/s41467-020-14970-1

22. Perlaza K, Toutkoushian H, Boone M, Lam M, **Iwai M**, Jonikas MC, Walter P*, Ramundo S* (2019) The Mars1 kinase confers photoprotection through signaling in the chloroplast unfolded protein response. ***eLife*** 8: e49577. DOI:10.7554/eLife.49577

21. Roth MS*, Westcott D, **Iwai M**, Niyogi KK* (2019) Hexokinase is necessary for glucose-mediated photosynthesis repression and lipid accumulation in a green alga. ***Communications Biology*** 2: 347-357. DOI:10.1038/s42003-019-0577-1

20. Yokono M*, Takabayashi A, Kishimoto J, Fujita T, **Iwai M**, Murakami A, Akimoto S, Tanaka A (2019) The PSI-PSII megacomplex in green plants. ***Plant & Cell Physiology*** 60: 1098-1108. DOI:10.1093/pcp/pcz026

19. Park S, Steen C, Lyska D, Fischer AL, Endelman B, **Iwai M**, Niyogi KK, Fleming GR* (2019) Chlorophyll-carotenoid excitation energy transfer and charge transfer in *Nannochloropsis oceanica* for the regulation of photosynthesis. ***Proceedings of the National Academy of Sciences of the United States of America*** 116: 3385-3390. DOI:10.1073/pnas.1819011116

18. Roth MS*, Gallaher SD, Westcott DJ, **Iwai M**, Louie KB, Mueller M, Walter A, Foflonker F, Bowen BP, Ataii NN, Song J, Chen J-H, Blaby-Haas CE, Larabell C, Auer M, Northen TR, Merchant SS, Niyogi KK* (2019) Regulation of oxygenic photosynthesis during trophic transitions in the green alga *Chromochloris zofingiensis*. ***The Plant Cell*** 31: 579-601. DOI: 10.1105/tpc.18.00742

17. **Iwai M†***, Grob P†, Iavarone AT, Nogales E, Niyogi KK* (2018) A unique supramolecular organization of photosystem I in the moss *Physcomitrella patens*. ***Nature Plants*** 4: 904-909. †Authors contributed equally. DOI:10.1038/s41477-018-0271-1

16. Park S, Fischer AL, Steen C, **Iwai M**, Morris JM, Walla PJ, Niyogi KK, Fleming GR* (2018) Chlorophyll-carotenoid excitation energy transfer in high-light-acclimating thylakoid membranes investigated by snapshot transient absorption spectroscopy. ***Journal of the American Chemical Society*** 140, 11965-11973. DOI:10.1021/jacs.8b04844

15. **Iwai M***, Roth MS, Niyogi KK* (2018) Subdiffraction-resolution live-cell imaging for visualizing thylakoid dynamics. ***The Plant Journal*** 96, 233-243. DOI:10.1111/tpj.14021.

14. **Iwai M***, Yokono M (2017) Light-harvesting antenna complexes in the moss *Physcomitrella patens*: implications for the evolutionary transition from green algae to land plants. ***Current Opinion in Plant Biology*** 37, 94-101. DOI:10.1016/j.pbi.2017.04.002

13. Kromdijk J, Głowacka K, Leonelli L, Gabilly S, **Iwai M**, Niyogi KK*, Long SP* (2016) Improving photosynthesis and crop productivity by accelerating recovery from photoprotection. ***Science*** 354, 857-861. DOI:10.1126/science.aai8878

12. **Iwai M***, Yokono M, Kurokawa K, Ichihara A, Nakano A (2016) Live-cell visualization of excitation energy dynamics in chloroplast thylakoid structures. ***Scientific Reports*** 6, 29940. DOI:10.1038/srep29940

11. **Iwai M***, Yokono M, Nakano A (2015) Toward understanding the multiple spatiotemporal dynamics of chlorophyll fluorescence. ***Plant Signaling & Behavior*** 10:6, e1022014. DOI:10.1080/15592324.2015.1022014

10. **Iwai M***, Yokono M, Kono M, Noguchi K, Akimoto S, Nakano A (2015) Light-harvesting complex Lhcb9 confers a green alga-type photosystem I supercomplex to the moss *Physcomitrella patens*. ***Nature Plants*** 1, 34-40. DOI:10.1038/nplants.2014.8

9. **Iwai M***, Yokono M, Nakano A (2014) Visualizing structural dynamics of thylakoid membranes. ***Scientific Reports*** 4, 3768. DOI:10.1038/srep03768

8. **Iwai M***, Pack C-G, Takenaka Y, Sako Y, Nakano A (2013) Photosystem II antenna phosphorylation-dependent protein diffusion determined by fluorescence correlation

spectroscopy. ***Scientific Reports*** 3, 2833. DOI:10.1038/srep02833

7. **Iwai M†**, Takizawa K†, Tokutsu R, Okamuro A, Takahashi Y, Minagawa J* (2010) Isolation of the elusive supercomplex that drives cyclic electron flow in photosynthesis. ***Nature*** 464: 1210-1213. †Authors contributed equally. DOI:10.1038/nature08885
6. **Iwai M**, Yokono M, Inada N, Minagawa J* (2010) Live-cell imaging of photosystem II antenna dissociation during state transitions. ***Proceedings of the National Academy of Sciences of the United States of America*** 107: 2337-2342. DOI:10.1073/pnas.0908808107
5. Swingley WD, **Iwai M**, Chen Y, Ozawa S, Takizawa K, Takahashi Y, Minagawa, J* (2010) Characterization of photosystem I antenna proteins in the prasinophyte *Ostreococcus tauri*. ***Biochimica et Biophysica Acta*** 1797: 1458-1464. DOI:10.1016/j.bbabio.2010.04.017
4. Tokutsu R, **Iwai M**, Minagawa J* (2009) CP29, a monomeric light-harvesting complex II protein, is essential for state transitions in *Chlamydomonas reinhardtii*. ***The Journal of Biological Chemistry*** 284: 7777–7782. DOI:10.1074/jbc.m809360200
3. **Iwai M**, Takahashi Y, Minagawa J* (2008) Molecular remodeling of photosystem II during state transitions in *Chlamydomonas reinhardtii*. ***The Plant Cell*** 20: 2177-2189. DOI:10.1105/tpc.108.059352
2. **Iwai M**, Kato N, Minagawa J* (2007) Distinct physiological responses to a high light and low CO_2 environment revealed by fluorescence quenching in phototrophically grown *Chlamydomonas reinhardtii*. ***Photosynthesis Research*** 94: 307-314. DOI:10.1007/s11120-007-9220-y
1. Takahashi H†, **Iwai M†**, Takahashi Y, Minagawa J* (2006) Identification of the mobile light-harvesting complex II polypeptides for state transitions in *Chlamydomonas reinhardtii*. ***Proceedings of the National Academy of Sciences of the United States of America*** 103: 477-482. †Authors contributed equally. DOI:10.1073/pnas.0509952103

Fellowships, Grants & Awards

2019	**Talk Award - 28th Western Photosynthesis Conference 2019:** The role of Lhcb9 in the unique photosystem I supercomplex formation in the moss *Physcomitrella patens*
2014-2015	**Grant-in-Aid for Challenging Exploratory Research - Japan Society for the Promotion of Science:** Development of proteoliposome reconstitution imaging of thylakoid membrane proteins
2012-2015	**Precursory Research for Embryonic Science and Technology - Japan Science and Technology Agency:** Study of plant photoadaptation mechanisms by using live cell imaging techniques
2011-2013	**Grant-in-Aid for Young Scientists (A) - Japan Society for the Promotion of Science:** Investigation of light energy redistribution mechanisms under stress environments in the moss *Physcomitrella patens*
2011	**Individual Collaborative Research Projects - National Institute of Basic Biology:** Spectroscopy analysis of photoacclimation mechanisms in *Physcomitrella patens*
2010	**Grant-in-Aid for Young Scientists (B) - Japan Society for the Promotion of Science:** Visualization of photosynthetic protein complex network during photoacclimation mechanisms (Withdrawn)
2010	**Individual Collaborative Research Grant - Institute of Low Temperature Science, Hokkaido University:** The study of photosynthetic activities of giant chloroplasts in *Physcomitrella patens*
2010	**Collaboration Seed Fund - RIKEN:** Nano-scale analysis of chloroplast thylakoid membranes using atomic force microscopy
2009-2010	**Grant-in-Aid for Young Scientists (Start-up) - Japan Society for the Promotion**

	of Science: Development of live-cell imaging for photosystem proteins by using the *Physcomitrella patens* giant chloroplasts
2009-2011	**Grant for Special Postdoctoral Researchers - RIKEN:** Visualization of thylakoid membrane dynamics during photoacclimation
2006-2009	**Grant-in-Aid for JSPS Fellows (DC1) - Japan Society for the Promotion of Science:** Investigation of photoacclimation mechanisms of light-harvesting complex proteins using the green alga Chlamydomonas reinhardtii
2005-2006	**Nara Institute of Science and Technology "Plant Science Education Project" - The Ministry of Education, Culture, Sports, Science and Technology:** Proteomics and visualization of photosynthetic proteins during state transitions
2004	**Institute of Low Temperature Science, Hokkaido University:** Director Leadership Fund (by Prof. Takeo Hondoh) - Travel award for The 13th International Conference on Photosynthesis, Montreal, Canada

Professional Presentations

2020	Department Seminar at Northern Illinois University (Invited online talk)
2020	Big Quantum in Proteins International Meeting (Invited online talk)
2020	Bioenergetics Seminar, Berkeley, CA, USA (Online talk)
2020	29th Western Photosynthesis Conference, Bodega Bay, CA, USA (Talk)
2019	28th Western Photosynthesis Conference, Friday Harbor, WA, USA (Talk & Poster)
2018	Molecular Biophysics & Integrated Bioimaging Division Annual Meeting, Berkeley, CA, USA (Invited Talk)
2016	Bioenergetics Seminar, Berkeley, CA, USA (Talk)
2016	The 13th Annual Advanced Imaging Methods Workshop, Berkeley, CA, USA (Poster)
2015	Plant & Microbial Biology Department Student & Postdoc Seminar, Berkeley, CA, USA (Talk)
2015	The 56th Annual Meeting of Japan Society of Plant Physiologists, Tokyo, Japan (Talk)
2015	The 17th Plant Organelle Workshop, Tokyo, Japan (Invited Talk)
2015	Precursory Research for Embryonic Science and Technology Project Research Seminar, Tokyo, Japan (Talk)
2015	RIKEN 4D Symposium, Saitama, Japan (Poster)
2014	Core Research for Evolutionary Science and Technology/Precursory Research for Embryonic Science and Technology Joint Project Meeting, Tokyo, Japan (Talk)
2014	RIKEN Symposium for Advanced Photonics, Saitama, Japan (Poster)
2014	The 40th Annual Meeting of the Japan Society for Laser Microscopy, Saitama, Japan (Talk)
2014	Precursory Research for Embryonic Science and Technology Project Meeting, Shizuoka, Japan (Talk)
2014	RIKEN Symposium for Advanced Photonics, Saitama, Japan (Poster)
2014	Japan Society for the Promotion of Science Project Seminar (Invited Talk)
2013	Core Research for Evolutionary Science and Technology/Precursory Research for Embryonic Science and Technology Joint Project Meeting, Tokyo, Japan (Talk)
2013	RIKEN Symposium for Advanced Photonics, Saitama, Japan (Poster)
2013	Precursory Research for Embryonic Science and Technology Project Meeting, Kyoto, Japan (Talk)
2013	The 4th Annual Symposium of The Japanese Society of Photosynthesis Research, Nagoya, Japan (Invited Talk)
2013	The 54th Annual Meeting of Japan Society of Plant Physiologists, Okayama, Japan (Talk)
2013	RIKEN Kibo Symposium, Saitama, Japan (Invited Talk)
2012	RIKEN Extreme Photonics Research Symposium, Saitama, Japan (Poster)
2012	Precursory Research for Embryonic Science and Technology Project Meeting, Tokyo, Japan (Talk)
2012	RIKEN Symposium, Saitama, Japan (Invited Talk)
2012	Okayama University International Symposium, Okayama, Japan (Poster)

2012 The 50th Annual Meeting of the Biophysical Society of Japan, Nagoya, Japan (Poster)
2012 Japanese-Finnish Photosynthesis Research Conference, Turku, Finland (Invited Talk)
2012 Core Research for Evolutionary Science and Technology/Precursory Research for Embryonic Science and Technology Joint Project Meeting, Hokkaido, Japan (Invited Talk)
2012 Precursory Research for Embryonic Science and Technology Project Meeting, Shizuoka, Japan (Talk)
2012 Gordon Research Conference, Davidson, NC, USA (Poster)
2012 The 15th Annual Moss International Conference, The Bronx, NY, USA (Poster)
2012 The 53rd Annual Meeting of Japan Society of Plant Physiologists, Kyoto, Japan (Talk)
2012 Kyoto University Research Seminar, Kyoto, Japan (Invited Talk)
2012 Precursory Research for Embryonic Science and Technology Kick-Off Meeting, Kyoto, Japan (Talk)
2011 The 8th Chlamydomonas Workshop, Tokyo, Japan (Talk)
2011 The 24th Japanese Association of Plant Lipid Researchers Annual Symposium, Tokyo, Japan (Poster)
2011 RIKEN Extreme Photonics Research Seminar, Saitama, Japan (Poster)
2011 The 52rd Annual Meeting of Japan Society of Plant Physiologists, Sendai, Japan (Talk)
2011 Institute for Protein Research Seminar, Osaka, Japan (Poster)
2010 RIKEN Extreme Photonics Research Seminar, Saitama, Japan (Poster)
2010 Tokyo University Research Seminar, Tokyo, Japan (Invited Talk)
2010 The 51st Annual Meeting of Japan Society of Plant Physiologists, Kumamoto, Japan (Talk)
2010 RIKEN Advanced Science Institute-Yokohama Joint Research Forum, Yokohama, Japan (Poster)
2009 RIKEN Advanced Science Institute- BioResource Research Center Joint Research Forum, Saitama, Japan (Poster)
2009 RIKEN Extreme Photonics Research Seminar, Saitama, Japan (Poster)
2009 RIKEN Seminar, Saitama, Japan (Talk)
2009 Nara Institute of Science and Technology Symposium, Nara, Japan (Invited Talk)
2009 The 50th Annual Meeting of Japan Society of Plant Physiologists, Nagoya, Japan (Talk)
2008 Nara Institute of Science and Technology Symposium, Nara, Japan (Invited Talk)
2008 The 49th Annual Meeting of Japan Society of Plant Physiologists, Sapporo, Japan (Talk)
2007 The Hokkaido Branch meeting for Botanical Society of Japan, Sapporo, Japan (Invited Talk)
2007 Satellite Meeting of the 14th International Congress on Photosynthesis "State Transitions", London, UK (Invited Talk)
2007 The 14th International Congress on Photosynthesis, Glasgow, Scotland (Poster)
2007 Nara Institute of Science and Technology Workshop, Nara, Japan (Talk)
2006 Japanese-Finnish Seminar, Nara, Japan (Talk & Poster)
2006 The 47th Annual Meeting of Japan Society of Plant Physiologists, Tsukuba, Japan (Talk)
2006 Nara Institute of Science and Technology Workshop, Nara, Japan (Talk)
2005 The 5th Chlamydomonas Workshop, Tsukuba, Japan (Talk)
2005 The 46th Annual Meeting of Japan Society of Plant Physiologists, Niigata, Japan (Talk)
2004 The 13th International Congress on Photosynthesis Research, Montreal, Canada (Poster)

Peer Review Services

Algal Research, *Biochimica et Biophysica Acta*, *Biophysical Journal*, *Botany Letters*, *Current Opinion in Plant Biology*, *Environmental and Experimental Botany*, French National Research Agency, *Journal of Visualized Experiments*, *Langmuir*, *Nature Plants*, *Photochemical & Photobiological Sciences*, *Planta*, *The Plant Cell*, *Plant Cell Physiology*, *Plant Methods*, *Plant Physiology*, *Plant Production Science*, *Proceedings of the National Academy of Sciences of the USA*, *Scientific Reports*

Outreach

2020	Online Science & Career Talk at The International Education Center at Diablo Valley College, CA, USA
2020	Online Science & Career Talk at NIC International College in Japan, Tokyo, Japan
2019-Present	Science Supervisor, Hanazono Junior/High School, Kyoto, Japan
2017	Career Talk at Diablo Valley College, Pleasant Hill, CA, USA
2016	Invited Lecture, Sonoma State University, CA, USA
2014	Science Seminar at Seishin High School and Junior High School, Ibaraki, Japan
2012	'Aesthetic' Panel Science Exhibition 2012, Tokyo, Japan
2011	A column in In-Cube (Leave a Nest), No. 14, June 2011
2011	A column in The Business & Technology Daily News (Feb. 1st, 2011)
2010-2014	Biannual Science Talk at NIC International College in Japan, Tokyo, Japan (every Fall and Spring semester during the 5-year period)
2010	Invited Science Presentation Contest in Science Agora 2010 at National Museum of Emerging Science and Innovation, Tokyo, Japan
2010	Editing Adviser, White Paper on Science and Technology for Children 2010, JST.
2010	A column in RIKEN News, Sept. 2010
2010	Science Talk at National Museum of Emerging Science and Innovation, Tokyo, Japan
2009	Science Presentation Contest in Science Agora 2009 at National Museum of Emerging Science and Innovation, Tokyo, Japan (The 1st place winner)

Mentorship

Megan Ogburn, Lab Technician, UC Berkeley (Feb. 2021 - Present)
Kylie Ren, Undergraduate Researcher, UC Berkeley (Mar. 2020 - Present)
Maddy Chapman, Undergraduate Researcher, UC Berkeley (Jan. 2020 - Present)
Victoria Kim, Undergraduate Researcher, UC Berkeley (Nov. 2019 - Present)
Valerie Lam, Undergraduate Researcher, Lab Technician, UC Berkeley (Oct. 2019 - Dec. 2020)
Christine Pagotan, Undergraduate Researcher, UC Berkeley (Oct. 2019 - Mar. 2020)
Veronica Wong, Undergraduate Researcher, UC Berkeley (May 2019 - Present)
Kumiko Yanagihara, Undergraduate Researcher, UC Berkeley (Aug. 2018 - Dec. 2019)
Mimi Broderson, Lab Technician, UC Berkeley (Sept. 2017 - Apr. 2020)
Arnold Chan, Undergraduate Researcher, UC Berkeley (Feb. 2017 - Aug. 2018)
Hiroe Watanabe, Lab Technician, RIKEN (Apr. 2012 - Mar. 2015)
Kaoru Kotoshiba, Lab Technician, RIKEN (Apr. 2012 - Mar. 2015)