

## CURRICULUM VITAE

**Name:** Takuhiro Ito  
**Sex:** Male  
**Date of birth:** 7 October 1973  
**Place of birth:** Chiba, Japan  
**Nationality:** Japanese  
**Present Address:** Translation Factors Structural Biology Unit,  
Structural Biology Group,  
Division of Structural and Synthetic Biology (SSB),  
RIKEN Center for Life Science Technologies (CLST)  
1-7-22 Suehiro-cho, Tsurumi-ku, Yokohama 230-0045, Japan

### Education:

1992/4-1994/3 Stream Natural Science I, College of Arts and Sciences (Junior Division), The University of Tokyo  
1994/4-1996/3 Department of Biophysics and Biochemistry, Faculty of Science, The University of Tokyo  
Awarded the degree of BS in Biophysics and Biochemistry  
1996/4-1998/3 Department of Biophysics and Biochemistry, Graduate School of Science, The University of Tokyo  
Awarded the degree of MS in Biophysics and Biochemistry  
Work supervised by Lecturer Dr. Yutaka Muto  
1998/4-2001/3 Department of Biophysics and Biochemistry, Graduate School of Science, The University of Tokyo  
Awarded the degree of Ph.D. in Biophysics and Biochemistry for a thesis entitled "Structural Biological Studies of RNA-binding domains of human U2AF<sup>65</sup>".  
Work supervised by Professor Dr. Shigeyuki Yokoyama

### Research experience:

1998/4-2001/3 Research Fellow of the Japan Society for the Promotion of Science (DC1)  
2001/4-2004/8 Postdoctoral research fellow at Department of Biological Chemistry and Molecular Pharmacology, Harvard Medical School, supervised by Professor Dr. Gerhard Wagner

2004/9-2005/3	Research associate at Genomic Science Center, RIKEN
2005/3-2010/6	Research associate at Department of Biophysics and Biochemistry, Graduate School of Science, The University of Tokyo
2010/7-2012/3	Project research associate at Laboratory of Structural Biology, Graduate School of Science, The University of Tokyo
2012/4-2013/3	Research scientist at Systems and Structural Biology Research Team, RIKEN Systems and Structural Biology Center
2013/4-present	Unit Leader at Translation Factors Structural Biology Unit, RIKEN Center for Life Science Technologies

## Publication:

### Original Papers

1. Kuwasako, K., Nameki, N., Tsuda, K., Takahashi, M., Sato, A., Tochio, N., Inoue, M., Terada, T., Kigawa, T., Kobayashi, N., Shirouzu, M., **Ito, T.**, Sakamoto, T., Wakamatsu, K., Güntert, P., Takahashi, S., Yokoyama, S. and Muto, Y. (2017) Solution structure of the first RNA recognition motif domain of human spliceosomal protein SF3b49 and its mode of interaction with a SF3b145 fragment. *Protein Sci*, **26**, 280-291. DOI: 10.1002/pro.3080.
2. Christian, T., Sakaguchi, R., Perlinska, A.P., Lahoud, G., **Ito, T.**, Taylor, E.A., Yokoyama, S., Sulkowska, J.I. and Hou, Y.-M. (2016) Methyl transfer by substrate signaling from a knotted protein fold. *Nat Struct Mol Biol*, **23**, 941-948. DOI:10.1038/nsmb.3282. (Epub 2016 Aug 29)
3. Kashiwagi, K., Shigeta, T., Imataka, H., **Ito, T.\*** and Yokoyama, S.\* (2016) Expression, purification, and crystallization of *Schizosaccharomyces pombe* eIF2B. *J Struct Funct Genomics*, **17**, 33-38. DOI: 10.1007/s10969-016-9203-3. (Epub 2016 Mar 29) (\* co-corresponding authors)
4. Kashiwagi, K., Takahashi, M., Nishimoto, M., Hiyama, T.B., Higo, T., Umehara, T., Sakamoto, K., **Ito, T.\*** and Yokoyama, S.\* (2016) Crystal structure of eukaryotic translation initiation factor 2B. *Nature*, **531**, 122-125. DOI: 10.1038/nature16991. (Epub 2016 Feb 22) (\* co-corresponding authors)
5. **Ito, T.**, Masuda, I., Yoshida, K., Goto-Ito, S., Sekine, S., Suh, S.W., Hou, Y.-M. and Yokoyama, S. (2015) Structural Basis for methyl-donor-dependent and sequence-specific binding to tRNA substrates by knotted methyltransferase TrmD. *Proc Natl Acad Sci U S A*, **112**, E4197-E4205. DOI: 10.1073/pnas.1422981112. (Epub 2015 Jul 16)
6. Ehara, H., Makino, M., Kodama, K., **Ito, T.**, Sekine, S., Fukuzawa, S., Yokoyama,

- S. and Tachibana, K. (2015) Crystal Structure of okadaic acid binding protein 2.1: a sponge protein implicated in cytotoxin accumulation. *ChemBiochem*, **16**, 1435-1439. DOI: 10.1002/cbic.201500141. (Epub 2015 May 12)
7. Kanamori, T., Ohzeki, H., Masaki, Y., Ohkubo, A., Takahashi, M., Tsuda, K., **Ito, T.**, Shirouzu, M., Kuwasako, K., Muto, Y., Sekine, M. and Seio, K. (2015) Controlling the fluorescence of benzofuran-modified uracil residues in oligonucleotides by triple-helix formation. *ChemBiochem*, **16**, 167-76. DOI: 10.1002/cbic.201402346. (Epub 2014 Dec 2)
  8. Kuwasako, K.<sup>#</sup>, Takahashi, M.<sup>#</sup>, Unzai, S., Tsuda, K., Yoshikawa, S., He, F., Kobayashi, N., Guntert, P., Shirouzu, M., **Ito, T.**, Tanaka, A., Yokoyama, S., Hagiwara, M., Kuroyanagi, H. and Muto, Y. (2014) RBFOX and SUP-12 sandwich a G base to cooperatively regulate tissue-specific splicing. *Nat Struct Mol Biol*, **21**, 778-86. DOI: 10.1038/nsmb.2870. (Epub 2014 Aug 17) (<sup>#</sup> equally contributed)
  9. Kashiwagi, K., **Ito, T.** and Yokoyama, S. (2014) Crystal structure of the eukaryotic translation initiation factor 2A from *Schizosaccharomyces pombe*. *J Struct Funct Genomics*, **15**, 125-130. DOI: 10.1007/s10969-014-9177-y. (Epub 2014 Feb 26)
  10. Nakagawa, H., Kuratani, M., Goto-Ito, S., **Ito, T.**, Katsura, K., Terada, T., Shirouzu, M., Sekine, S., Shigi, N. and Yokoyama, S. (2013) Crystallographic and mutational studies on the tRNA thiouridine synthetase TtuA. *Proteins*, **81**, 1232-44. DOI: 10.1002/prot.24273. (Epub 2013 Apr 10)
  11. Hanawa-Suetsugu, K., Kukimoto-Niino, M., Mishima-Tsumagari, C., Akasaka, R., Ohsawa, N., Sekine, S.-I., **Ito, T.**, Tochio, N., Koshihara, S., Kigawa, T., Terada, T., Shirouzu, M., Nishikimi, A., Uruno, T., Katakai, T., Kinashi, T., Kohda, D., Fukui, Y. and Yokoyama, S. (2012) Structural basis for mutual relief of the Rac guanine nucleotide exchange factor DOCK2 and its partner ELMO1 from their autoinhibited forms. *Proc Natl Acad Sci U S A*, **109**, 3305-10. DOI: 10.1073/pnas.1113512109. (Epub 2012 Feb 13)
  12. Georges, L., Goto-Ito, S., Yoshida, K., **Ito, T.**, Yokoyama, S. and Hou, Y.-M. (2011) Differentiating analogous tRNA methyltransferases by fragments of the methyl donor. *RNA*, **17**, 1236-1246. DOI: 10.1261/rna.2706011. (Epub 2011 May 20)
  13. Ito, T.\* , **Ito, T.\*** and Yokoyama, S. (2011) Plasma-assisted biological macromolecular crystallization. *Applied Physics Express*, **4**, 026201. DOI: 10.1143/APEX.4.026201. (Epub 2011 Feb 8) (\* equally contributed)
  14. **Ito, T.** and Yokoyama, S. (2010) Two enzymes bound to one transfer RNA assume

- alternative conformations for consecutive reactions. *Nature*, **467**, 612-616. DOI: 10.1038/nature09411. (Epub 2010 Sep 29)
15. Kuratani, M., Hirano, M., Goto-Ito, S., Itoh, Y., Hikida, Y., Nishimoto, M., Sekine, SI., Bessho, Y., **Ito, T.**, Grosjean, H. and Yokoyama, S. (2010) Crystal Structure of *Methanocaldococcus jannaschii* Trm4 complexed with sinefungin. *J Mol Biol*, **401**, 323-333. DOI: 10.1016/j.jmb.2010.06.046. (Epub 2010 Jun 30)
  16. **Ito, T.**, Kiyasu, N., Matsunaga, R., Takahashi, S. and Yokoyama, S. (2010) Crystal structure of nondiscriminating glutamyl-tRNA synthetase from *Thermotoga maritima*. *Acta Crystallogr D Biol Crystallogr*, **66**, 813-820. DOI: 10.1107/S0907444910019086. (Epub 2010 Jun 19)
  17. Goto-Ito, S., **Ito, T.**, Kuratani, M., Bessho, Y. and Yokoyama, S. (2009) Tertiary structure checkpoint at anticodon loop modification in tRNA functional maturation. *Nat Struct Mol Biol*, **16**, 1109-1115. DOI: 10.1038/nsmb.1653. (Epub 2009 Sep 13)
  18. Hiyama, T.B., **Ito, T.**, Imataka, H. and Yokoyama, S. (2009) Crystal Structure of the alpha subunit of human translation initiation factor 2B. *J Mol Biol*, **392**, 937-951. DOI: 10.1016/j.jmb.2009.07.054. (Epub 2009 Jul 22)
  19. Goto-Ito, S., **Ito, T.**, Ishii, R., Muto, Y., Bessho, Y. and Yokoyama, S. (2008) Crystal Structure of Archaeal tRNA (m1G37) methyltransferase aTRM5. *Proteins*, **72**, 1274-1289. DOI: 10.1002/prot.22019. (Epub 2008 Apr 2)
  20. Goto-Ito, S., Ishii, R., **Ito, T.**, Shibata, R., Fusatomi E., Sekine, S., Bessho, Y. and Yokoyama, S. (2007) Structure of an archaeal TYW1, the enzyme catalyzing the second step of wye-base biosynthesis. *Acta Crystallogr D Biol Crystallogr*, **63**, 1059-1068. DOI: 10.1107/S0907444907040668. (Epub 2007 Sep 19)
  21. **Ito, T.** and Wagner, G. (2007) Resonance assignments of the  $\alpha$  subunit of human eukaryotic initiation factor 2 (eIF2 $\alpha$ ). *J Biomol NMR*, **38**, 173. DOI: 10.1007/s10858-006-9099-5. (Epub 2006 Nov 23)
  22. Gelev, V., Aktas, H., Marintchev, A., **Ito, T.**, Frueh, D., Hemond, M., Rovnyak, D., Debus, M., Hyberts, S., Usheva, A., Halperin, J. and Wagner, G. (2006) Mapping of the Auto-Inhibitory Interactions of Protein Kinase R by Nuclear Magnetic Resonance. *J Mol Biol*, **364**, 352-363. DOI: 10.1016/j.jmb.2006.08.077. (Epub 2006 Sep 1)
  23. Frueh, D.P., **Ito, T.**, Li, J.-S., Wagner, G., Glaser, S.J., and Khaneja, N. (2005) Sensitivity enhancement in NMR of macromolecules by application of optimal control theory. *J Biomol NMR*, **32**, 23-30. DOI: 10.1007/s10858-005-3592-0.
  24. **Ito, T.**, Marintchev, A. and Wagner, G. (2004) Solution structure of human

- initiation factor eIF2 $\alpha$  reveals homology to the elongation factor eEF1B. *Structure*, **12**, 1693-1704. DOI: 10.1016/j.str.2004.07.010.
25. Kato, M., **Ito, T.**, Wagner, G. and Ellenberger, T. (2004) A molecular handoff between bacteriophage T7 DNA primase and T7 DNA polymerase initiates DNA synthesis. *J Biol Chem*, **279**, 30554-62. DOI: 10.1074/jbc.M403485200. (Epub 2004 May 8)
  26. **Ito, T.** and Wagner, G. (2004) Using codon optimization, chaperone co-expression, and rational mutagenesis for production and NMR assignments of human eIF2 $\alpha$ . *J Biomol NMR*, **28**, 357-367. DOI: 10.1023/B:JNMR.0000015405.62261.cb.
  27. Kato, M., **Ito, T.**, Wagner, G., Richardson, C.C. and Ellenberger, T. (2003) Modular architecture of the bacteriophage T7 primase couples RNA primer synthesis to DNA synthesis. *Mol Cell*, **11**, 1349-1360. DOI: 10.1016/S1097-2765(03)00195-3.
  28. Kitamura, A., Muto, Y., Watanabe, S., Kim, I., **Ito, T.**, Nishiya, Y., Sakamoto, K., Ohtsuki, T., Kawai, G., Watanabe, K., Hosono, K., Takaku, H., Katoh, E., Yamazaki, T., Inoue, T. and Yokoyama, S. (2002) Solution structure of an RNA fragment with the P7/P9.0 region and the 3'-terminal guanosine of the tetrahymena group I intron. *RNA*, **8**, 440-451. DOI: 10.1017.S1355838202026043.
  29. **Ito, T.**, Muto, Y., Green, M.R. and Yokoyama, S. (1999) Solution structures of the first and second RNA-binding domains of human U2 small nuclear ribonucleoprotein particle auxiliary factor (U2AF<sup>65</sup>). *EMBO J*, **18**, 4523-4534. DOI: 10.1093/emboj/18.16.4523. (Epub 1999 Aug 16)

### Proceedings

1. Kitamura, A., Muto, Y., Watanabe, S., Kim, I., **Ito, T.**, Nishiya, Y., Ohtsuki, T., Kawai, G., Watanabe, K., Hosono, K., Takaku, H., Katoh, E., Yamazaki, T., Inoue, T. and Yokoyama, S. (1999) The guanosine binding mechanism of the Tetrahymena group I intron. *Nucleic Acids Symp Ser*, **42**, 191-192.

### Review in English

1. Goto-Ito, S., **Ito, T.**\* and Yokoyama, S.\* (2017) Trm5 and TrmD: two enzymes from distinct origins catalyze the identical tRNA modification, m<sup>1</sup>G37. *Biomolecules*, **7**, E32. DOI:10.3390/biom7010032. (Epub 2017 Mar 21) (\* co-corresponding authors)
2. Kashiwagi, K., **Ito, T.**\* and Yokoyama, S.\* (2017) Crystal structure of eIF2B and insights into eIF2-eIF2B interactions. *FEBS J*, **284**, 868-874

DOI:10.1111/febs.13896. (Epub 2016 Sep 14) (\* co-corresponding authors)

3. **Ito, T.** and Yokoyama, S. (2011) Crystal structure of glutamine transamidosome: two enzymes bond to one transfer RNA function cooperatively for consecutive reactions. *Photon Factory Activity Report 2010*, **28**, 48-49.
4. **Ito, T.** and Yokoyama, S. (2011) Crystal structure of glutamine transamidosome reveals how two enzymes bound to one tRNA assume alternative conformations for consecutive reactions. *Spring-8 Research Frontiers 2010*, 20-21.