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Education

1986-1990 B.S. Seoul National University, Korea (Department of Chemistry)

1990-1992 M.S. Seoul National University, Korea (Department of Chemistry)

Thesis Title: Crystallization and Preliminary X-ray Analysis of Alpha-amylase from *Bacillus subtilis*

1992-1997 Ph.D. Seoul National University, Korea (Department of Chemistry)

Thesis Title: Crystal Structure Analyses of Thermostable Xylose Isomerase from *Thermus* Species

Employment

October 2009 ~ current; Principal Structural Biology Specialist

Argonne National Laboratory

Bioscience Division, Structural Biology Center

June 2004 ~ September 2009; Assistant Scientist-Protein Crystallographer

Argonne National Laboratory

Bioscience Division, Structural Biology Center

October 1999 ~ June 2004; Postdoctoral Research Fellow

NCI-Frederick Cancer Research and Development Center

Macromolecular Crystallography Laboratory

March 1999 ~ October 1999; Postdoctoral Fellow

NCI-Frederick Cancer Research and Development Center

ABL-Basic Research Program

Macromolecular Structure Laboratory

May 1997 ~ February 1999; Researcher

Department of Chemistry, Seoul National University

Center for Molecular Catalysis

March 1995 ~ July 1995; Guest Researcher

Korea Research Institute of Bioscience and Biotechnology, KIST, Korea
Molecular & Cell Biology Research Division

March 1994 ~ November 1994; Guest Researcher

Korea Research Institute of Bioscience and Biotechnology, KIST, Korea
Molecular & Cell Biology Research Division

Current research field of interest: Protein crystallography, Structural genomics, Structural biology, Protein X-ray crystallography

Publication List

Original papers: [1-33]

1. Michalska, K., C. Chang, J.C. Mack, S. Zerbs, A. Joachimiak, and F.R. Collart, "Characterization of Transport Proteins for Aromatic Compounds Derived from Lignin: Benzoate Derivative Binding Proteins". *J Mol Biol*, 2012. **423**(4): p. 555-75.
2. Deshpande, C.N., S.J. Harrop, Y. Boucher, K.A. Hassan, R. Di Leo, X. Xu, H. Cui, A. Savchenko, C. Chang, M. Labbate, I.T. Paulsen, H.W. Stokes, P.M. Curmi, and B.C. Mabbutt, "Crystal Structure of an Integron Gene Cassette-Associated Protein from *Vibrio Cholerae* Identifies a Cationic Drug-Binding Module". *PLoS One*, 2011. **6**(3): p. e16934.
3. Binkowski, T.A., M. Cuff, B. Nocek, C. Chang, and A. Joachimiak, "Assisted Assignment of Ligands Corresponding to Unknown Electron Density". *J Struct Funct Genomics*, 2010. **11**(1): p. 21-30.
4. Chang, C., C. Tesar, M. Gu, G. Babnigg, A. Joachimiak, P.R. Pokkuluri, H. Szurmant, and M. Schiffer, "Extracytoplasmic Pas-Like Domains Are Common in Signal Transduction Proteins". *J Bacteriol*, 2010. **192**(4): p. 1156-9.
5. Tchigvintsev, A., X. Xu, A. Singer, C. Chang, G. Brown, M. Proudfoot, H. Cui, R. Flick, W.F. Anderson, A. Joachimiak, M.Y. Galperin, A. Savchenko, and A.F. Yakunin, "Structural Insight into the Mechanism of C-Di-Gmp Hydrolysis by Eal Domain Phosphodiesterases". *J Mol Biol*, 2010. **402**(3): p. 524-38.
6. Chang, C., P. Coghill, A. Bateman, R.D. Finn, M. Cymborowski, Z. Otwinowski, W. Minor, L. Volkart, and A. Joachimiak, "The Structure of Pyogenecin Immunity Protein, a Novel Bacteriocin-Like Immunity Protein from *Streptococcus Pyogenes*". *BMC Struct Biol*, 2009. **9**: p. 75.

7. Brown, G., A. Singer, M. Proudfoot, T. Skarina, Y. Kim, C. Chang, I. Dementieva, E. Kuznetsova, C.F. Gonzalez, A. Joachimiak, A. Savchenko, and A.F. Yakunin, "Functional and Structural Characterization of Four Glutaminases from *Escherichia Coli* and *Bacillus Subtilis*". *Biochemistry*, 2008. **47**(21): p. 5724-35.
8. Kim, Y., P. Quartey, H. Li, L. Volkart, C. Hatzos, C. Chang, B. Nocek, M. Cuff, J. Osipiuk, K. Tan, Y. Fan, L. Bigelow, N. Maltseva, R. Wu, M. Borovilos, E. Duggan, M. Zhou, T.A. Binkowski, R.G. Zhang, and A. Joachimiak, "Large-Scale Evaluation of Protein Reductive Methylation for Improving Protein Crystallization". *Nat Methods*, 2008. **5**(10): p. 853-4.
9. Dong, A., X. Xu, A.M. Edwards, C. Chang, M. Chruszcz, M. Cuff, M. Cymborowski, R. Di Leo, O. Egorova, E. Evdokimova, E. Filippova, J. Gu, J. Guthrie, A. Ignatchenko, A. Joachimiak, N. Klostermann, Y. Kim, Y. Korniyenko, W. Minor, Q. Que, A. Savchenko, T. Skarina, K. Tan, A. Yakunin, A. Yee, V. Yim, R. Zhang, H. Zheng, M. Akutsu, C. Arrowsmith, G.V. Avvakumov, A. Bochkarev, L.G. Dahlgren, S. Dhe-Paganon, S. Dimov, L. Dombrowski, P. Finerty, Jr., S. Flodin, A. Flores, S. Graslund, M. Hammerstrom, M.D. Herman, B.S. Hong, R. Hui, I. Johansson, Y. Liu, M. Nilsson, L. Nedyalkova, P. Nordlund, T. Nyman, J. Min, H. Ouyang, H.W. Park, C. Qi, W. Rabeh, L. Shen, Y. Shen, D. Sukumard, W. Tempel, Y. Tong, L. Tresagues, M. Vedadi, J.R. Walker, J. Weigelt, M. Welin, H. Wu, T. Xiao, H. Zeng, and H. Zhu, "In Situ Proteolysis for Protein Crystallization and Structure Determination". *Nat Methods*, 2007. **4**(12): p. 1019-21.
10. Nocek, B., C. Chang, H. Li, L. Lezondra, D. Holzle, F. Collart, and A. Joachimiak, "Crystal Structures of Delta1-Pyrroline-5-Carboxylate Reductase from Human Pathogens *Neisseria Meningitidis* and *Streptococcus Pyogenes*". *J Mol Biol*, 2005. **354**(1): p. 91-106.
11. Chang, C., A. Pluckthun, and A. Wlodawer, "Crystal Structure of a Truncated Version of the Phage Lambda Protein Gpd". *Proteins*, 2004.

12. Forrer, P., C. Chang, D. Ott, A. Wlodawer, and A. Pluckthun, "Kinetic Stability and Crystal Structure of the Viral Capsid Protein Shp". *J Mol Biol*, 2004. **344**(1): p. 179-93.
13. Chang, C., E. Magracheva, S. Kozlov, S. Fong, G. Tobin, S. Kotenko, A. Wlodawer, and A. Zdanov, "Crystal Structure of Interleukin-19 Defines a New Subfamily of Helical Cytokines". *J Biol Chem*, 2003. **278**(5): p. 3308-13.
14. Yang, J.K., C. Chang, S.J. Cho, J.Y. Lee, Y.G. Yu, S.H. Eom, and S.W. Suh, "Crystallization and Preliminary X-Ray Analysis of the Mj0684 Gene Product, a Putative Aspartate Aminotransferase, from Methanococcus Jannaschii". *Acta Crystallogr D Biol Crystallogr*, 2003. **59**(Pt 3): p. 563-565.
15. Chang, C., D.L. Newton, S.M. Rybak, and A. Wlodawer, "Crystallographic and Functional Studies of a Modified Form of Eosinophil-Derived Neurotoxin (Edn) with Novel Biological Activities". *J Mol Biol*, 2002. **317**(1): p. 119-30.
16. Min, K., H.K. Song, C. Chang, S.Y. Kim, K.J. Lee, and S.W. Suh, "Crystal Structure of Human Nucleoside Diphosphate Kinase a, a Metastasis Suppressor". *Proteins*, 2002. **46**(3): p. 340-342.
17. Chang, C., A. Mooser, A. Pluckthun, and A. Wlodawer, "Crystal Structure of the Dimeric C-Terminal Domain of Tonb Reveals a Novel Fold". *J Biol Chem*, 2001. **276**(29): p. 27535-40.
18. Han, G.W., J.Y. Lee, H.K. Song, C. Chang, K. Min, J. Moon, D.H. Shin, M.L. Kopka, M.R. Sawaya, H.S. Yuan, T.D. Kim, J. Choe, D. Lim, H.J. Moon, and S.W. Suh, "Structural Basis of Non-Specific Lipid Binding in Maize Lipid-Transfer Protein Complexes Revealed by High-Resolution X-Ray Crystallography". *J Mol Biol*, 2001. **308**(2): p. 263-278.
19. Lee, B.I., C. Chang, S.J. Cho, S.H. Eom, K.K. Kim, Y.G. Yu, and S.W. Suh, "Crystal Structure of the Mj0490 Gene Product of the Hyperthermophilic Archaeobacterium Methanococcus

- Jannaschii, a Novel Member of the Lactate/Malate Family of Dehydrogenases". *J Mol Biol*, 2001. **307**(5): p. 1351-1362.
20. Lee, B.I., C. Chang, S.J. Cho, G.W. Han, Y.G. Yu, S.H. Eom, and S.W. Suh, "Lactate Dehydrogenase from the Hyperthermophilic Archaeon Methanococcus Jannaschii: Overexpression, Crystallization and Preliminary X-Ray Analysis". *Acta Crystallogr D Biol Crystallogr*, 2000. **56 (Pt 1)**: p. 81-83.
21. Lee, J.Y., C. Chang, H.K. Song, J. Moon, J.K. Yang, H.K. Kim, S.T. Kwon, and S.W. Suh, "Crystal Structure of Nad(+)-Dependent DNA Ligase: Modular Architecture and Functional Implications". *EMBO J*, 2000. **19**(5): p. 1119-1129.
22. Lee, J.Y., H.K. Kim, C. Chang, S.H. Eom, K.Y. Hwang, Y. Cho, Y.G. Yu, S.E. Ryu, S.T. Kwon, and S.W. Suh, "Crystallization and Preliminary X-Ray Crystallographic Analysis of Nad+-Dependent DNA Ligase from Thermus Filiformis". *Acta Crystallogr D Biol Crystallogr*, 2000. **56 (Pt 3)**: p. 357-358.
23. Min, K., S.Y. Kim, H.K. Song, C. Chang, S.J. Cho, J. Moon, J.K. Yang, J.Y. Lee, K.J. Lee, and S.W. Suh, "Crystallization and Preliminary X-Ray Crystallographic Analysis of Human Nucleoside Diphosphate Kinase A". *Acta Crystallogr D Biol Crystallogr*, 2000. **56 (Pt 4)**: p. 503-504.
24. Min, K., H.K. Song, C. Chang, J.Y. Lee, S.H. Eom, K.K. Kim, Y.G. Yu, and S.W. Suh, "Nucleoside Diphosphate Kinase from the Hyperthermophilic Archaeon Methanococcus Jannaschii: Overexpression, Crystallization and Preliminary X-Ray Crystallographic Analysis". *Acta Crystallogr D Biol Crystallogr*, 2000. **56 (Pt 11)**: p. 1485-1487.
25. Chang, C., B.C. Park, D.S. Lee, and S.W. Suh, "Crystal Structures of Thermostable Xylose Isomerases from Thermus Caldophilus and Thermus Thermophilus: Possible Structural Determinants of Thermostability". *J Mol Biol*, 1999. **288**(4): p. 623-634.

26. Chang, C., H.K. Song, B.C. Park, D.S. Lee, and S.W. Suh, "A Thermostable Xylose Isomerase from *Thermus Caldophilus*: Biochemical Characterization, Crystallization and Preliminary X-Ray Analysis". *Acta Crystallogr D Biol Crystallogr*, 1999. **55**(Pt 1): p. 294-6.
27. Sohn, S.H., H.K. Song, K. Min, S.J. Cho, J. Moon, J.Y. Lee, H.J. Ahn, C. Chang, H.J. Kim, and S.W. Suh, "Crystallization and Preliminary X-Ray Crystallographic Analysis of Deoxycytidylate Hydroxymethylase from Bacteriophage T4". *Acta Crystallogr D Biol Crystallogr*, 1999. **55**(5): p. 1061-1063.
28. Chang, C., B.C. Park, D.S. Lee, and S.W. Suh, "A Thermostable Xylose Isomerase from *Thermus Thermophilus*: Biochemical Characterization, Crystallization, and Preliminary X-Ray Analysis.". *J Biochem Mol Biol*, 1998. **31**: p. 600-603.
29. Hwang, K.Y., H.K. Song, C. Chang, J. Lee, S.Y. Lee, K.K. Kim, S. Choe, R.M. Sweet, and S.W. Suh, "Crystal Structure of Thermostable Alpha-Amylase from *Bacillus Licheniformis* Refined at 1.7 Å Resolution". *Mol. Cells*, 1997. **7**(2): p. 251-258.
30. Kim, Y., J.S. Kim, Y. Park, C.S. Chang, S.W. Suh, and D.S. Lee, "Mutagenesis of the Positively Charged Conserved Residues in the 5' Exonuclease Domain of Taq DNA Polymerase". *Mol Cells*, 1997. **7**(4): p. 468-72.
31. Park, B.C., S. Koh, C. Chang, S.W. Suh, D.S. Lee, and S.M. Byun, "Cloning and Expression of the Gene for Xylose Isomerase from *Thermus Flavus* At62 in *Escherichia Coli*". *Appl Biochem Biotechnol*, 1997. **62**(1): p. 15-27.
32. Cheong, C.G., S.H. Eom, C. Chang, D.H. Shin, H.K. Song, K. Min, J.H. Moon, K.K. Kim, K.Y. Hwang, and S.W. Suh, "Crystallization, Molecular Replacement Solution, and Refinement of Tetrameric Beta-Amylase from Sweet Potato". *Proteins*, 1995. **21**(2): p. 105-117.

33. Chang, C., K.K. Kim, K.Y. Hwang, M.U. Choi, and S.W. Suh, "Crystallization and Preliminary X-Ray Crystallographic Analysis of Alpha-Amylase from Bacillus Subtilis". *J Mol Biol*, 1993. **229**(1): p. 235-238.