Curriculum Vitae

Name
Eriko Nango

Current Position
Professor
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Education & Professional Experiences
1995-1999: B.Sc. in Chemistry, Tokyo Institute of Technology, Japan, 1999-2001: M.Sc. in Chemistry, Tokyo Institute of Technology, 2001-2004: Completed Ph.D. program without dissertation in Chemistry, Tokyo Institute of Technology, Japan (2007 Ph.D. in Chemistry, Tokyo Institute of Technology), 2004-2010: Assistant Professor, Department of Chemistry, Tokyo Institute of Technology, 2010-2013: Research Associate, RIKEN SPring8-Center, Japan, 2013-2019: Research Scientist, RIKEN Spring8-Center, 2019: Assistant Professor, Graduate School of Medicine, Kyoto University, 2019-2020: Program-Specific Associate Professor, Graduate School of Medicine, Kyoto University

Research Interests
Structural dynamics, Time-resolved study, X-ray free-electron lasers

Selected Publications
1. Nango, E., Royant, A., …Neutze, R. and Iwata, S. A three-dimensional movie of structural changes in bacteriorhodopsin. *Science* 354, 1552-1557 (2016)
2. Wolff, AM, Nango, E, …Fraser, JS, Thompson, MC. Mapping protein dynamics at high spatial resolution with temperature-jump X-ray crystallography. *Nature Chemistry* 15, 1549-1558 (2023)
4. Maity, B., Shoji, M., …Nango, E., Ueno, T. Real-time observation of a metal complex-driven reaction intermediate using a porous protein crystal and serial femtosecond crystallography. *Nature Communications* 15, 5518 (2024)

Lecture Title
Three-dimensional molecular movies of structural changes in proteins captured by X-ray free-electron lasers

Abstract (500 words maximum)
Conventional X-ray protein crystallography captures only "static" structures due to the limitation of temporal resolution. Recently, X-ray free-electron lasers (XFELs) have become available in five countries worldwide, enabling the capture of dynamic structures at the atomic level with time resolutions of several tens of femtoseconds. In Japan, the XFEL facility, named SACLA (SPring-8 Angstrom Compact Free Electron Laser), began user operation in 2012, following the LCLS (Linac Coherent Light Source) in the United States. I have been working on the development of serial femtosecond crystallography (SFX), which is a protein structure determination technique, at SACLA and successfully obtained a three-dimensional molecular movie of various light-sensitive proteins, including bacteriorhodopsin,

chloride pump rhodopsin, channelrhodopsin, and photosystem II, by combining an XFEL with a pump laser to initiate photoreaction. This technique is suitable for tracking fast reactions, such as chemical reactions, because of its high temporal resolution.

Recently, mix-and-inject serial crystallography (MISC) has allowed visualization of structural changes and reactions in light-insensitive proteins, including enzymes and receptors. In MISC, microcrystals are rapidly mixed with a small molecule, such as a substrate and a ligand, in a microchannel and exposed to an XFEL pulse, resulting in visualization of the process of enzymatic reactions. In this presentation, I will present our development of techniques for molecular movie analysis and several successful results using the techniques.