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CMI-P-03

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Research Keywords

Fluorescence imaging, Bioluminescence analysis, Optogenetics

Academic Career

I received a PhD in 1998 from the Department of Chemistry, School of Science, the University of Tokyo, under the supervisor of professor Yoshio Umezawa. After spending five years as a assistant professor, I started an independent position as an Associate Professor at the Institute for Molecular Science (IMS), Japan, since 2005. While at the University of Tokyo and the IMS, he contributed to the development of fluorescence and bioluminescence imaging probes and their application in live cells. In 2007, I joined again the Department of Chemistry, School of Science at the University of Tokyo, as a full professor.

Selected Publications

Inhibition of formyl peptide receptor-1-mediated cell death as a therapy for lethal cutaneous drug reactions in preclinical models. H. Kimura, et al. Nature Commun. 16, 8708 (2025).

An optical approach to modulating membrane protein endocytosis using a light-responsive tag for recruiting β-arrestin. Q. Kuang, et al. ACS Chem. Biol., 20, 1516-1526 (2025).

Class 3 PI3K participates in nuclear gene transcription and co-activates the circadian clock to promote de novo purine synthesis. C. Alkhoury, et al. Nature Cell Biol., 25, 975-988 (2023).

Optogenetic decoding of Akt2-regulated cellular metabolic signaling pathways in skeletal muscle cells using transomics analysis. G. Kawamura, et al. Science Signaling, 16, eabn0782 (2023).

Mechanistic insights into cancer drug resistance through optogenetic PI3K signaling hyperactivation. Y. Ueda, et al. Cell Chem. Biol. 29, 1576-1587 (2022).

N-Heterocyclic carbene-based C-centered Au(I)-Ag(I) clusters with intense phosphorescence and the ligand-specific, organelle-selective translocation in cells. Z. Lei, et al. Nature Commun., 13, 4288 (2022).

Sustained accurate recording of intracellular acidification in living tissues with a photo-controllable bioluminescent protein. M. Hattori, et al. Proc. Natl. Acad. Sci. USA, 110, 9332-9337 (2013).

Imaging dynamics of endogenous mitochondrial RNA in single living cells. T. Ozawa, et al. Nature Methods, 4, 413-419 (2007).

Why My Lab?

My lab can offer...

Our lab is comprised of a multidisciplinary team of scientists who specialize in analytical chemistry, molecular imaging, protein engineering, medicinal chemistry, physical chemistry, chemical biology, and basic biology. Although we are part of the chemistry department, our lab interacts across conventional boundaries with

researchers in systems biology, medicine, agriculture, physics, and biology.

We are exploring new optical methods to deepen the understanding of biological systems and to break new ground in applications to the world of life. For this objective, our laboratory is investigating methods for optical imaging, chemical library screening, cDNA library screening, and optogenetic modules to control enzymatic activities in complex biological systems of interest.