

Photopharmacological Approaches for Mitotic Cell Division

Kazuya Matsuo

Faculty of Molecular Chemistry and Engineering, Kyoto Institute of Technology

kmatsuo@kit.ac.jp

During the dynamic process of mitotic cell division, chromosomes were delivered along spindle microtubules from mitotic poles to the cell equatorial plane, which was catalyzed by a mitotic motor protein of centromere-associated protein E (CENP-E). Dysfunction of CENP-E causes chromosome accumulation around mitotic poles, which often leads to uneven population of chromosome pairs in the next generation of daughter cells. Thus, the precise control of CENP-E should be the promising approach for the versatile manipulation and/or engineering of not only chromosome movements/positioning during mitosis but also cell fates in daughter cells. Recently, we developed some photoswitchable tools¹⁻³ targeting CENP-E and another key protein in cell division based on the *cis-trans* isomerization of the azobenzene derivatives. In this presentation, the rational design, fundamental characteristics, and photopharmacological application of our photoswitchable tools will be discussed.

References:

- [1] Mafy, N. N.; Matsuo, K.; Hiruma, S.; Uehara, R.; Tamaoki, N. *J. Am. Chem. Soc.* **2020**, *142*, 1763.
- [2] Matsuo, K.; Tamaoki, N. *Org. Biomol. Chem.* **2021**, *19*, 6979.
- [3] Matsuo, K.; Thayyil, S.; Kawaguchi, M.; Nakagawa, H.; Tamaoki, N. *Chem. Commun.* **2021**, *in press* (DOI : 10.1039/D1CC04905D).



Assistant Professor (Tenure track), Kazuya, Matsuo

Kyoto Institute of Technology

E-mail: kmatsuo@kit.ac.jp

Research Interest: Chemical biology

Academic background:

2021-present Assistant Professor (Tenure track), Faculty of Molecular Chemistry and Engineering, Kyoto Institute of Technology with MEXT Leading Initiative for Excellent Young Researcher (LEADER)

2015-2021 Assistant Professor, Research Institute for Electronic Science, Hokkaido University

2014-2015 Research Associate, The Scripps Research Institute, San Diego, USA

2010-2014 Ph.D., Graduate School of Engineering, Kyoto University