

Development of single-molecule imaging-based screening technology for drug discovery

Principal Investigator

Graduate School of Frontier Biosciences, The University of Osaka

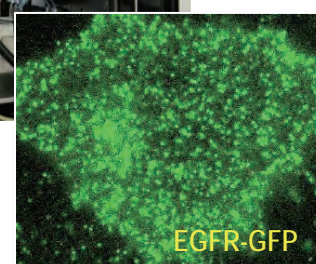
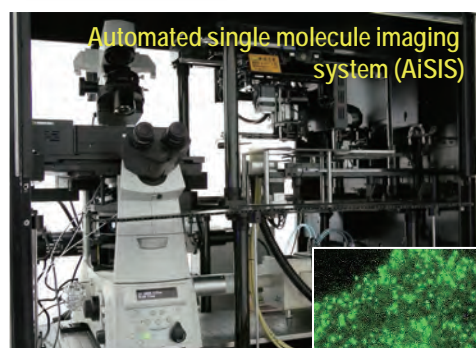
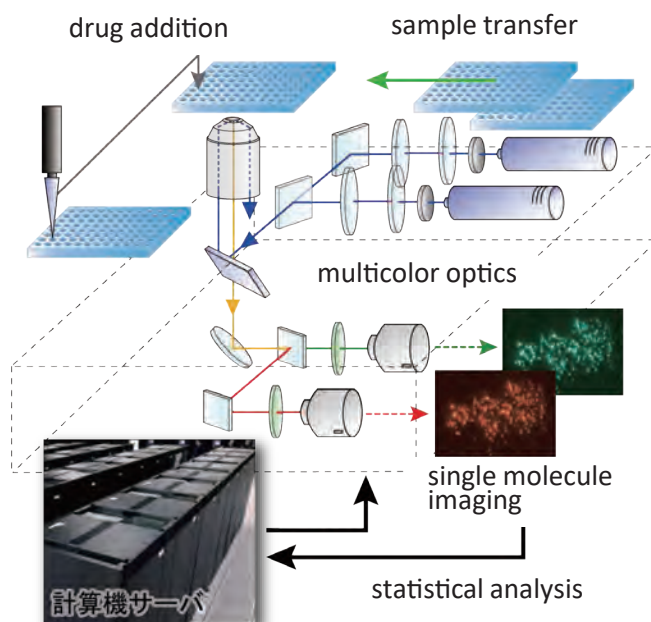
Professor Masahiro UEDA

Project Outline

Single-molecule imaging-based screening for drug discovery

- Novel platform technology -

Single molecule imaging analysis enables us to visualize biomolecules functioning in cells, and to obtain quantitative values related to the diffusion and oligomerization of membrane proteins. We have developed a fully automated single molecule imaging system (AiSIS) and have realized large-scale analysis in living cells (right figure). By applying this method to epidermal growth factor receptor (EGFR), which is the cause of various cancers, we are establishing it as a novel basic technology for drug discovery. Since this approach can be applied to molecular species without enzymatic activity and orphan receptors, it has the potential to realize drug screening for target molecules to which existing methods are difficult to be applied.



Core Technologies

Machine learning (AI) and robotics-assisted automated imaging analysis

- Automatic cell recognition and observation by using machine learning
- Analysis of diffusion and oligomer formation of 8,000 cells per day
- Detection of drug-induced changes in molecular dynamics
- Automated single molecule imaging analysis of various receptors

Yasui et al., *Nature Commun.* 9: 3061 (2018)

Watanabe et al., *Nature Commun.* 15:8975(2024)

Target diseases: Lung cancer, colorectal cancer, brain and central nervous system cancer, pancreatic cancer, etc
 Patent information: Patent 6952300, Patent 7226825, Patent Application 2023-31358, US Patent 11002728、US Patent 11567293B2

Characteristics of technology: Drug screening by visualizing single-molecules functioning in cells

Marketability, challenges in development: Development of drug candidates after single molecule screening