

人工発光酵素を用いた一分子型発光プローブの創製

Fabrication of Single-Chain Bioluminescent Probes from Artificial Luciferases

Sung-Bae Kim¹

¹, Research Institute for Environmental Management Technology, National Institute of Advanced Industrial Science and Technology (AIST), 16-1 Onogawa, Tsukuba 305-8569, Japan
Email: kimu-sb@aist.go.jp

Bioluminescent imaging facilitates comprehensive elucidation of intracellular molecular events. Recently, we fabricated a series of artificial luciferases (ALuc[®]) as a man-made optical readout by extracting the frequently occurring consensus amino acids from the public database of copepod luciferase. ALucs exert unique optical properties (heat stability, dramatically enhanced optical intensity and prolonged stability) and sequential identities (ca. 75%) that are clearly different from those of any existing marine luciferase. The practical advantage and applications of ALucs will be demonstrated in the presentation with detailed substrate selectivity, bioluminescence imaging of live cells, and bioluminescent measures including single-chain bioluminescent probe and molecular strain probe. The ALuc-based measures allow illumination of hormonal activities of steroids and endocrine disrupting chemicals^[1-2].

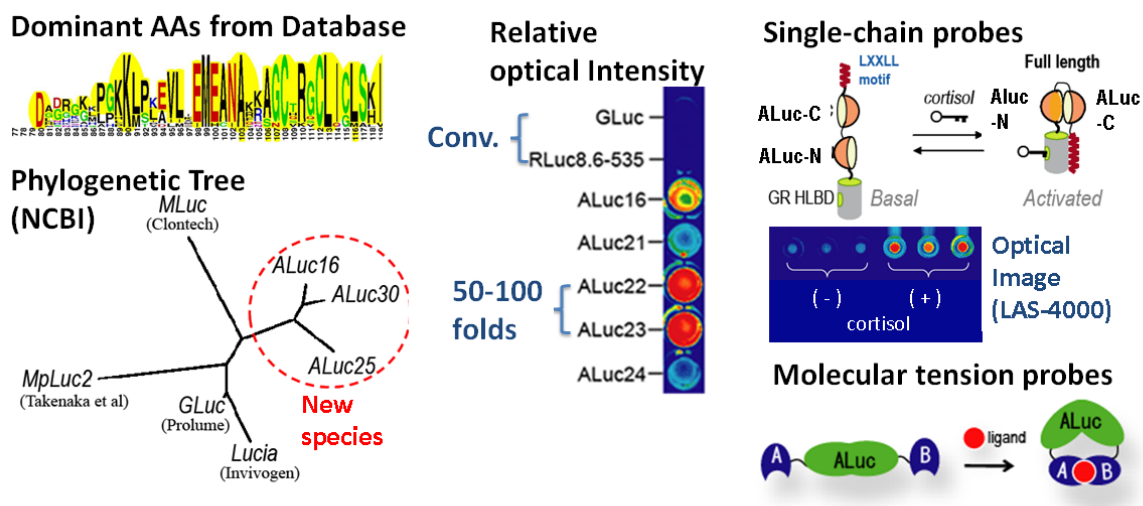


Fig. 1 Fabrication of ALucs and applications for molecular imaging. By aligning frequently occurring amino acids, a series of ALucs was created, which is phylogenetically distinctive from conventional marine luciferases (left column). The optical intensity and stability are superior to the conventional World Bests (middle column). Further, single-chain probes with ALucs efficiently elevate the bioluminescence intensities in response to ligands (right column).

[1] Kim et al. (2013) Creation of Artificial Luciferases for Bioassays. *Bioconjugate Chem.* **24**: 2067–2075 (ACS).

[2] Kim et al. (2016) Genetically Encoded Molecular Tension Probe for Tracing Protein-Protein Interactions in Mammalian Cells. *Bioconjugate Chem.* **27**: 354–362 (ACS).