

## UPDATE FROM THE CUTTING EDGE

Apr.-Jun. 2014

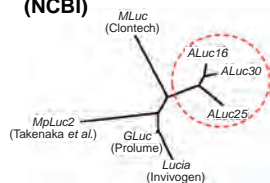
The abstracts of the recent research information appearing in Vol.14 No.4-6 of "AIST TODAY" are introduced here, classified by research areas. For inquiry about the full article, please contact the author via e-mail.

Environment and Energy

### Artificially designed and created luciferase Approximately 100 times brighter than existing world-bests

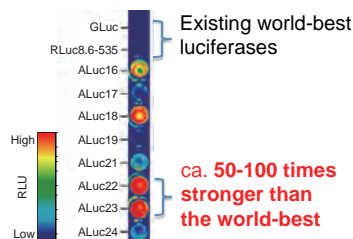
We have created superluminescent luciferases with artificial design, exerting greatly prolonged bioluminescence. We have studied *de novo* luciferases derived from luminous plankton (copepods), where we aligned the amino-acid sequences of a variety of existing copepod luciferases in public databases and extracted frequently occurring key amino acids, which thermodynamically stabilize the whole sequence. Considering that the *de novo* luciferases are genetically highly unique compared to any existing luciferases, they were named artificial luciferases (ALuc<sup>TM</sup>; trade mark of AIST). ALuc are up to 100 times brighter than conventional world-bests and exhibit excellent luminescence sustainability (half-life: 20 minutes). The created ALuc is advantageous over any conventional luciferases in terms of enhancement in sensitivity, reduction of the measurement time, and light permeability in the tissues of living organisms, indicating merits as an excellent luminescent marker for basic research in life science and applications to medical and environmental diagnoses.

Phylogenetic tree (NCBI)



Artificial luciferase (ALuc)  
(max. identity: below 70 %)

Relative optical intensity



Existing world-best luciferases

ca. 50-100 times stronger than the world-best

Comparison of artificial luciferases (ALuc) and conventional world-best luciferases

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AIST TODAY Vol.14 No.5 p.14 (2014)