



Department of Biotechnology  
Ministry of Science and Technology  
Government of India  
**DBT**



National Institute of  
Advanced Industrial Science  
and Technology  
**AIST**

# DBT - AIST International Laboratory for Advanced Biomedicine

## DAIILAB

## Classroom for Advanced & Frontier Education CAFE

## DAIILAB-CAFE

### Series - 001

Date and Time - June 13, 2014/ 4 PM ~

Venue - Central 6-9; 2F (Room-228)

Speaker - Yoshihiro Nakajima

Affiliation - Biofunctional Regulation Research Group, Health Research Institute, AIST

E-mail: [y-nakajima@aist.go.jp](mailto:y-nakajima@aist.go.jp)



### Title - A multicolor luciferase assay system for monitoring multiple gene expressions: Basics and application

Bioluminescent reporters, which emit light by oxidizing its substrate luciferin, have become an essential tool for studying various aspects of biological functions, including gene expression, posttranscriptional modification and protein-protein interactions, because the sensitivity and range of the linear response are superior to those of other reporters. In particular, luciferases are used as sensitive probes to monitor gene expression, quantitatively, and longitudinally in living cells, explant tissues, and *in vivo*.

Recent advances in luciferase technology, involving improvements in both the luciferase and the detection system and a newly cloned luciferase gene, allow us to monitor the expression of multiple genes simultaneously when luciferase are used that induce differently colored emission spectra in the catalysis of a common substrate. Recently, we have developed a multicolor luciferase assay system in which multiple gene expressions can be simultaneously monitored using green-, orange- and red-emitting beetle luciferases. Using this system, we have successfully monitored multiple gene expressions simultaneously, such as clock genes, inflammatory cytokine genes *in vitro* and *ex vivo*, and applied to cell based assay. In this seminar, I would like to present and discuss basic, utility and possibility of the luciferase assay system for life science study, drug discovery and chemical risk analysis.





DAILAB-CAFE 001 (2014|06|13): Dr. Nakajima



**DAILAB-CAFE**

**Topic - DBT**  
 Date and Time: June 13, 2014 (Thu)  
 Venue: Lecture A-17 (Room 410)  
 Location: Yashwantrao Chavan  
 Affiliation: Collaborative Research Program (Health Research, AIST)  
 E-mail: [arabid@aisf.ac.jp](mailto:arabid@aisf.ac.jp)

**Title - A multicolor luciferase assay system for monitoring multiple gene expressions.**  
**Relevance and application**  
 Bioluminescent reporters, which emit light by oxidizing its substrate luciferin, have become an essential tool for studying various aspects of biological functions, including gene expression, post-transcriptional modification and protein-protein interactions, because the sensitivity and range of the linear response are superior to those of other reporters. In particular, luciferases are used as sensitive probes to monitor gene expression quantitatively, and long-term stability in living cells, reporter activity, and so on.  
 Despite advances in luciferase technology, monitoring expressions in both the nucleus and the cytosol systems and a newly derived luciferase gene, allow us to monitor the expression of multiple genes simultaneously when luciferase are used that induce differently cultured animal species in the analysis of a common substrate. Recently, we have developed a multicolor luciferase assay system in which multiple gene expressions can be simultaneously monitored using green-, orange- and red-emitting luciferases. Using this system, we have successfully monitored multiple gene expressions simultaneously, such as clock genes, in mammalian cell lines in vitro and in vivo, and applied to cell-based assays. In this seminar, I would like to present and discuss basic ability and possibility of the luciferase assay system for the above fields, drug discovery and chemical lab analysis.

Dear Dr. Nakajima

*Please accept our thanks for being the  
 DAILAB-CAFE  
 Speaker  
 on  
 June 13, 2014  
 We enjoyed your talk and appreciate  
 your efforts !*

DAILAB-AIST