

5th RAP Seminar

The 5th Seminar on RIKEN Center for Advanced Photonics

Language: Japanese

Date : **Oct.11 (Fri), 2013, 15:00 ~ 16:00**

Location : Cooperation Center, 3F, W319, Wako Campus, RIKEN
(理研 和光キャンパス 研究交流棟3階会議室 W319)

Title : **Recent progress in FRET biosensor technology**
FRETバイオセンサー最近の進歩

Speaker: **Prof. Michiyuki MATSUDA**
(Graduate School of Biostudies, Kyoto University)

松田 道行 教授 (京都大学)

Genetically-encoded biosensors based on the principle of Förster resonance energy transfer (FRET) have been widely used in biology to visualise the spatiotemporal dynamics of signaling molecules. Despite the increasing multitude of these biosensors, their application has been mostly limited to cultured cells with transient biosensor expression, due to particular difficulties in the development of transgenic mice that express FRET biosensors. We have developed technologies to efficiently generate cell lines and transgenic mice expressing heritable and functional biosensors for signaling molecules, including protein kinases, low-molecular-weight GTPases, and phosphoinositides. With cell lines expressing FRET biosensors for ERK MAP kinase, we for the first time show that ERK activity can be stochastically fired and propagated to neighboring cells. Observation of the transgenic mice expressing FRET biosensors by two-photon excitation microscopy yielded real-time activity maps of signaling molecules in the brain, skin, enteric mucosa, and embryonic kidneys in both normal and inflamed states, with greatly improved signal-to-background ratios. Our transgenic mice may be bred into diverse genetic backgrounds; moreover, the protocol we have developed paves the way for the generation of transgenic mice that express other FRET biosensors, with important applications in the characterization of physiological and pathological signal transduction events in addition to drug development and screening.