

プログラム名：セレンディピティの計画的創出による新価値創造

PM名：合田 圭介

プロジェクト名：細胞刺激技術開発

委 託 研 究 開 発

実施状況報告書 (成果)

平成27年度

研究開発課題名：

Developing Novel Optical Probes to Understand Biological Activities

研究開発機関名：

Columbia University

研究開発責任者：

Masayuki Yazawa

Abstract

1. Activities, Accomplishment and Findings: An existing of major problem in the fields of biology and biomedical research is the difficulty for a variety of biological activities in live cells. To address this challenge, in order to monitor cellular activities, we developed novel biosensors, genetically encoded fluorescent indicators, to measure cellular metabolic substrates such as lactate, pyruvate and fatty acids in live cells. In addition, to control cellular and molecular activities precisely spatio-temporarily, we developed multiple new technologies to regulate gene expression and protein activity using light. Interdisciplinary approaches have been used with our experts in stem cell biology, biochemistry, molecular biology physiology, pharmacology, imaging, optogenetics and bioengineering. In addition, taking advantage of novel tools and outcomes in this study, we have conducted collaborative projects with Project2 Team 1 organized by Dr. Iwata in order to develop engineering *Euglena* that allows us to apply for further industrial productions of oil production and recombinant proteins in *Euglena*. We conducted gene transduction using electroporation and lipofection using plasmid DNA. However, we found that these approaches did not work for *Euglena*. Next year, we will test recombinant protein and synthesized RNA to conduct gene transduction and gene editing in *Euglena*.

2. Outreach, Events and Other Activities
 - 2-1) (Seminar) Department Seminar (invited) at Rutgers, NJ Medical School Department of Cell Biology and Molecular Medicine, April 25, 2016

 - 2-2) (Outreach) lecture (1.5 hr) for Gifu High School student tour at New York, March 18, 2016