

## AND ゲート型近赤外蛍光分子プローブを用いた細胞核内脱リン酸化酵素活性イメージング

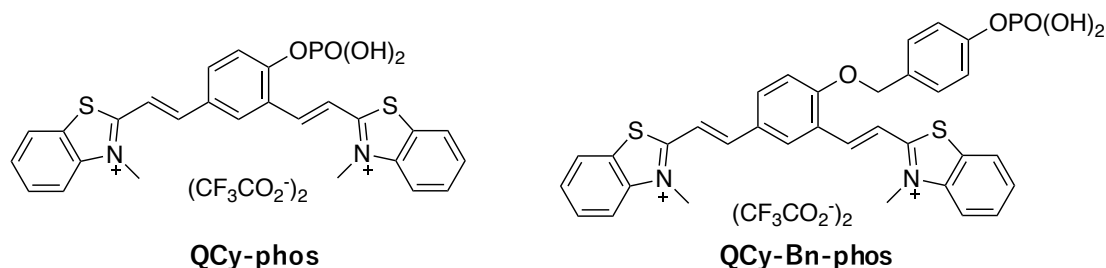
(和大院シス工) ○添田 高章・坂本 隆

Fluorescence imaging of dephosphorylation enzyme activity in cell nuclei using AND logic gate based NIR fluorescent probe (*Graduate School of Systems Engineering, Wakayama University*) ○Takayuki Soeda, Takashi Sakamoto

In most cases, fluorescent probes change its fluorescence behavior in response to a single target molecule, therefore, it is difficult to image target biomolecule with the environmental information around the target biomolecule, such as pH, viscosity and temperature. If we developed an AND-gate fluorescent probe that responds to two different stimuli, fluorescence imaging of target biomolecule including changes in the environment around the target biomolecule can be expected. To image specifically the cells at mitotic or apoptosis stage, in this study, we developed an AND logic gate based NIR fluorescent probe that responds to DNA and phosphatase activity (phos-QCy-DT). As the phosphatase activity in nuclei at mitotic or apoptosis stage is enhanced, phos-QCy-DT can visualize cell nuclei at mitotic or apoptosis stage. The phenolic hydroxy group of QCy-DT, whose NIR fluorescence drastically enhanced in the presence of dsDNA having AT rich sequence,<sup>1</sup> was modified with phosphate derivatives. Fluorescence properties of phos-QCy-DT and imaging study of culture cells will be discussed.

**Keywords :** *Fluorescent probe; Quinone cyanine-dithiazole dye; AND logic gate based NIR fluorescent probe; Phosphatase activity; Double-stranded DNA*

蛍光プローブはほとんどの場合、単一の標的分子に応答してその蛍光挙動を変化させるため、標的生体分子の置かれている周辺環境まで含めた蛍光イメージングは困難である。「標的生体分子の存在」と「周辺環境」の2つの刺激に蛍光応答する、AND ゲート型蛍光プローブが開発できれば、標的生体分子周辺の環境の変化まで含めた生体分子イメージングが可能になると期待できる。本研究では、有糸分裂期やアポトーシス時に亢進することが知られている核内での脱リン酸化酵素活性に着目し、DNA と脱リン酸化酵素活性の2つの刺激に蛍光応答する AND ゲート型蛍光プローブ (phos-QCy-DT) の開発を試みた。phos-QCy-DT の蛍光特性、および培養細胞の蛍光イメージングについて議論する。



1) Narayanaswamy, N. et al., *Nucleic Acids Res.*, **2015**, 43, 8651-8663.