Application of FRET based sensors in metabolite sensing in living cells

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ABSTRACT

Quantification and regulation of pathway metabolites is crucial for optimization of microbial production bioprocesses. Advances in molecular biology, organic chemistry, and materials science have recently created several new classes of fluorescent probes for imaging in cell biology. Genetically encoded nanosensors provide the means to couple metabolite sensing to several outputs invaluable for metabolic engineering. Various spectrometry techniques are used for monitoring ions and metabolites, although their temporal and spatial resolutions are limited. Discovery of the fluorescent proteins and their variants has revolutionized cell biology. The applications of Fluorescence resonance energy transfer (FRET) have expanded tremendously in the last 25 years, and the technique has become a staple technique in many biological and biophysical fields. FRET can be used as spectroscopic ruler in various areas such as structural elucidation of biological molecules and their interactions, *in vitro* assays, *in vivo* monitoring in cellular research, vitamins, amino acids, signal transduction, etc. Based on the mechanism of FRET a variety of novel chemical sensors and Biosensors have been developed.