

FRET Peptides – Fluorescence Resonance Energy Transfer Peptides

Description

FRET peptides are labelled with two dye molecules. These dyes can be identical, but in most applications different dyes are used.

FRET describes the transfer of energy from an initially excited donor (dye 1) to an acceptor (dye 2). This is a distance dependent dipole-dipole interaction without emission of a photon.

For efficient FRET the following requirements are needed:

- Close proximity between donor and acceptor (10-100 Å)
- Overlap of absorption spectrum of acceptor with emission spectrum of donor
- Transition dipole orientation of donor and acceptor approximately parallel

The energy transfer happens in one of two ways, depending on the chemical structure of the acceptor:

- the transferred energy is converted to molecular vibrations (acceptor is dark quencher)
- the transferred energy is emitted as light of longer wavelength (acceptor is fluorescent)

If the two dyes are separated from another (e.g. by protease cleavage of peptide), fluorescent signals are generated. These signals differ depending on the fluorescent characteristics of the dye pair:

Donor dye	Acceptor dye	Detectable signal
fluorescent	non fluorescent	increase of donor fluorescence
fluorescent	fluorescent	intensity ratio change of donor/acceptor fluorescence

Efficiency of FRET: $E = R_0^6 / (R_0^6 + r^6)$

E Efficiency of energy transfer

R_0 Distance at which the energy transfer is 50% (Förster – distance)

r Distance between donor and acceptor

Product offering

Available standard combinations are:

Dye 1	Dye 2
EDANS _ 5-((2-aminoethyl)amino)naphthalene-1-sulfonic acid	Dabcyl or Dabsyl
Nma _ 2-(N-methylamino)benzoyl	DNP_2,4-Dinitrophenyl
MCA _ Methoxy-coumarin-acetic-acid	DNP_2,4-Dinitrophenyl
Fluorescein	Dabcyl or Dabsyl
Fluorescein	Tamra
DY-630	DQ660

Please inquire for other combinations.

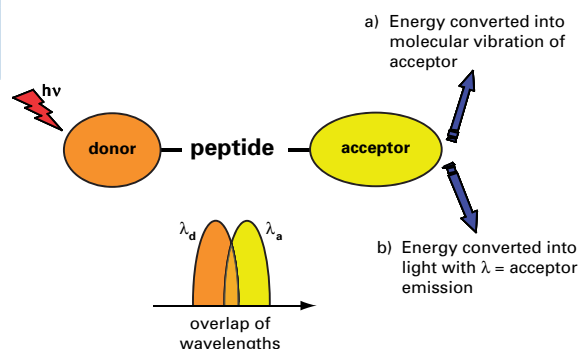
Application

FRET peptides are useful tools for the investigation of any biochemical reaction which causes a change in the physical distance between donor and acceptor molecule. If the donor fluorescence is quenched, it indicates that both donor and acceptor molecule are close (approx. 10 – 100 Å). If donor fluorescence can be detected, the molecules are more distant.

FRET peptides are used as suitable substrates in enzyme studies, such as:

- functional characterization of peptidases / proteases / kinases / phosphatases
- kinetic characterization of peptidases / proteases / kinases / phosphatases
- screening and detection of new proteolytic enzymes

or they can be used for conformational investigation of peptide folding.



Literature

1. Kokame K et al., (2005) FRET-VWF73, a first fluorogenic substrate for ADAMTS13 assay. *British Journal of Haematology*, 129, pp. 93-100
2. Volk, EL et al., (2003) A rapid assay for the quantitation of α -glutamyl hydrolase using a fluorogenic peptide as substrate. *Biotechniques* Vol.35, pp. 926-932
3. Montserrat Alvarez-Iglesias et al, (2005) Continuous real-time measurement of tumor necrosis factor- α converting enzyme activity on live cells. *Laboratory investigation*, Vol.85, pp. 1440-1148
4. Hongyan Sun et al, (2007) Activity based fingerprinting of proteases using FRET peptides. *Peptide Science*, Vol.88, Issue 2, pp. 141-149

Application Note:
TI-PEP03-0807

Sedanstrasse 18
89077 Ulm
Germany
Phone
+49 (0)731 93579 290
Fax
+49 (0)731 93579 291

Email:
services.biopolymers@thermo.com
web page:
www.thermo.com/biopolymers

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