Proteins that Efficiently Generate Singlet Oxygen Background

Tech ID: 20715 / UC Case 2010-049-0

BACKGROUND

Singlet oxygen generation is a well-known technique in proteomic studies that involve localization of proteins by electron microscopy, inactivation of proteins for functional studies, and measurement of the distances between interacting proteins.

One of the most widely used reagent systems is the biarsenical ReAsh-Tetracysteine system from Life Technologies. While partially genetically encoded, it requires the cells to be stimulated to overexpress a needed cofactor and generate singlet oxygen with a quantum yield of less than 0.05. Attempts to develop other systems have not resulted in higher quantum yields and, in some cases while resulting in fluorescence, have not been shown to produce singlet oxygen.

TECHNOLOGY DESCRIPTION

UC San Diego researchers have developed a fully genetically encoded singlet oxygen system called mini-SOG. The system uses truncated proteins that can be fused to a protein of interest and expressed in either bacterial or mammalian cells. Although requiring flavin mononucleotide (FMN) as a co-factor, it is endogenously available to cells, and because it is a derivative of riboflavin, no exogenous addition is necessary. The FMN holoprotein will fluoresce upon light excitation and generates singlet oxygen with quantum yields in excess of 0.4.

ADVANTAGES

- Significantly higher quantum yields than current system.
- No exogenous co-factors needed.
- Provides a new level of detection and utility for proteomic studies utilizing:
  - Electron microscopy and fluorescent imaging.
  - Chromophore assisted light inactivation for functional proteomics.
  - Greater monitoring of protein-protein distances than FRET based sensors that is independent of chromophore orientation.

INTELLECTUAL PROPERTY INFO

A provisional patent application has been filed.

RELATED MATERIALS

- Abstract presented at the 54th Annual Biophysical Society Meeting, February 20-24, 2010. Biophysical Journal, Volume 98, Issue 3, Supplement 1, January 2010, Page 612a.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,279,769	03/08/2016	2010-049
United States Of America	Published Application	20130330718	12/12/2013	2010-049

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Personalized Protease fingerprinting for early cancer diagnosis
- Dual Reflectance-Fluorescence Guided Surgical System

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OTHER INFORMATION

CATEGORIZED AS

- **Research Tools**
  - Cell Lines
  - Reagents

RELATED CASES

2010-049-0

- Molecules for Labeling Peripheral Nerves for use in Image Guided Surgery and Other Clinical Applications
- Proteins That Fluoresce At Infrared Wavelengths Or Singlet Oxygen Upon Illumination

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