Coelenterazine-Utilizing Luciferase Reporters with Extremely Stable Glow-Type Bioluminescent Signal

Development status

Phase 2

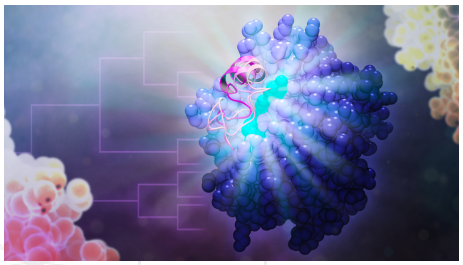
Feasibility study. There is a realistic design of the technology and the initial tests in the laboratory are leading to the specification of the technology requirements and its capabilities.

IP protection status

PCT application filed.

Partnering strategy

Collaboration, licensing



Institution

MUNI TTO Technology Transfer Office

Masaryk University

Challenge

Luminescence reporters are useful and popular tools in research and biotechnologies, allowing easy-to-use, rapid, safe, and sensitive monitoring of biological, biochemical, and chemical processes by measuring an optical signal. The luminescence process is initiated by the excitation of luminescent molecules to a high-energy state. Return to the ground state with lower energy is accompanied by the release of a photon, observable as light emission. Bioluminescence is a fascinating phenomenon involving the emission of light by a living creature. There is enormous interest in harnessing bioluminescent systems to design ultrasensitive optical bioassays. Despite many advances and improvements in luciferases, two major limitations are preserved. I. the flash-type of the signal with a short half-life prevents prolonged signal collection and analyses. II. moderate substrate affinity does not allow analyses at lower substrate concentrations with the maintained level of the detected signal.

Description

The present invention relates to modified protein sequences of coelenterazine-utilizing Renilla-type luciferases utilizing widely accessible, non-cytotoxic, and low-cost coelenterazine luciferin. These novel luciferases exhibit extremely stable glow-type light emission, high substrate affinity, low product inhibition factor, and modulated emission maximum. The luciferases are designed to provide ultrasensitive and stable bioluminescent signals in a wide range of laboratory applications and bioassay formats. Benefits: - extremely stable glow-type bioluminescent signal - high affinity towards luciferin substrate - low product inhibition - enhanced thermostability - high resistance to inactivation - high expressibility & solubility - no cytotoxicity - tunable light emission enabling multiplexing - highly compliant to crystalize & high diffraction quality. Applications: - wide range of biosensor and reporter applications and bioassay formats - in

vitro and in vivo bioimaging applications - long-term bioimaging with stable bioluminescent signal - suitable for bioluminescence resonance energy transfer (BRET) technologies - codon-optimized gene reporters for both bacterial and mammalian expression - his-tagged luciferases enabling affinity purification & immunodetection - recombinantly-produced and purified luciferases ready for use.

Commercial opportunity

The improved detection system is intended for all those who work with reporter asays for monitoring the expression of specific genes.