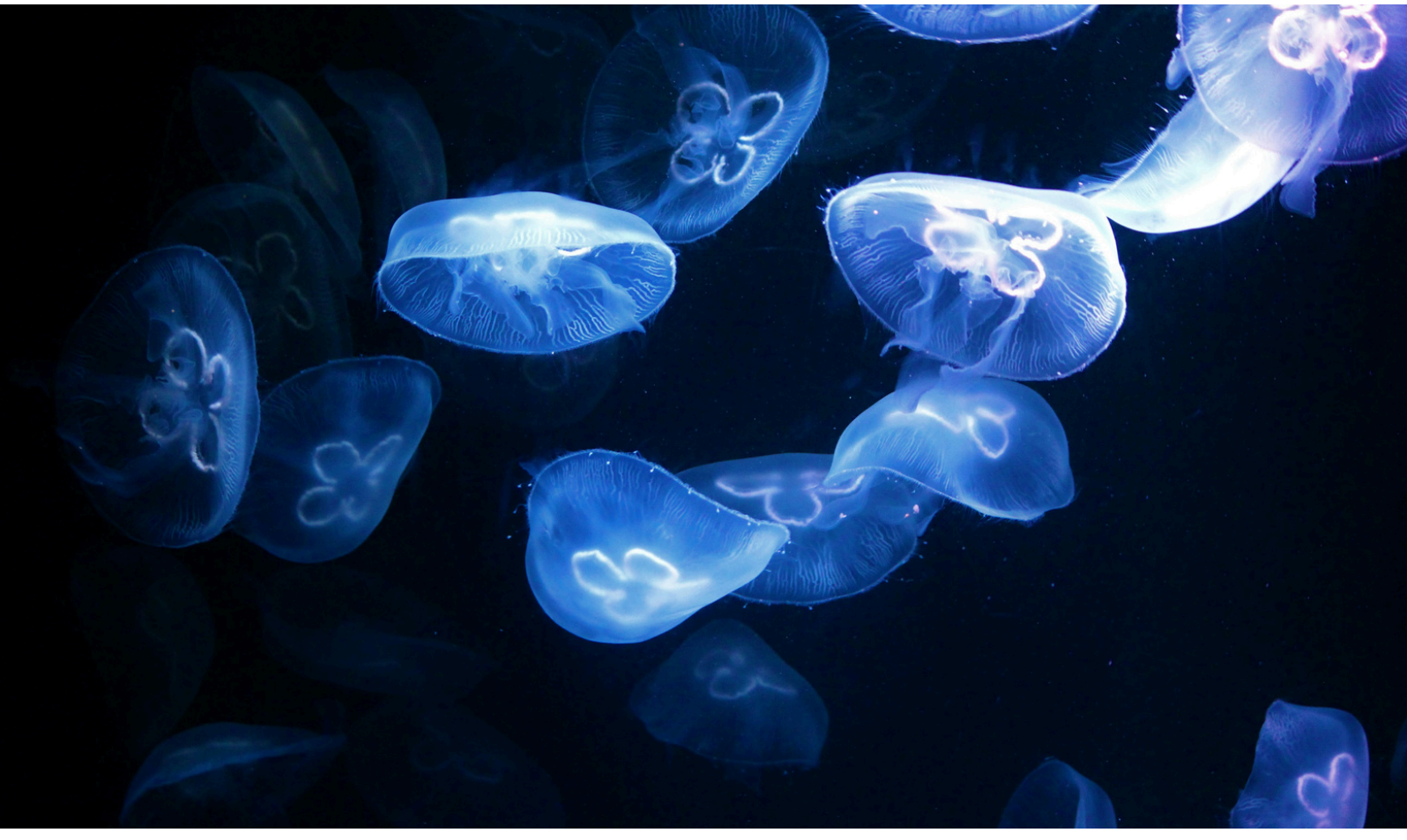
MASARYK UNIVERSITY

Novel Luciferases

Coelenterazine-utilizing luciferase reporters with an extremely stable glow-type bioluminescent signal



Seeking

Development partner
Licensing
Commercial partner
University spinout
Seeking investment

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CHALLENGE

Luminescent reporters are valuable and widely used tools in research and biotechnology, enabling rapid, safe, and sensitive monitoring of biological, biochemical, and chemical processes through optical signal detection. The luminescence process is initiated by the excitation of luminescent molecules to a high-energy state. Returning 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 significant advances and improvements in luciferase engineering, two major limitations remain. First, the flash-type bioluminescence signal with a short half-life prevents prolonged signal collection and analysis. Second, moderate substrate affinity limits performance at low substrate concentrations while maintaining sufficient signal intensity.

TECH OVERVIEW

This invention relates to engineered coelenterazine-utilizing Renilla-type luciferases based on modified protein sequences. The enzymes use widely available, low-cost, and non-cytotoxic coelenterazine as a substrate.
The novel luciferases generate a highly stable glow-type bioluminescent signal, exhibit high substrate affinity, low product inhibition, and tunable emission maxima (peaks). The proteins are optimized to deliver ultrasensitive and stable signal output across a broad range of laboratory and bioassay applications.

BENEFITS

- Extremely stable glow-type bioluminescent signal suitable for long-term measurements
- High affinity for the luciferin substrate
- Low product inhibition
- Enhanced thermostability and resistance to inactivation
- High expression levels and solubility in bacterial and mammalian expression systems
- No cytotoxicity
- Tunable light emission enabling multiplexing
- Highly amenable to crystallization and provides high diffraction quality

APPLICATIONS

- Biosensor and reporter assay development across multiple bioassay formats
- In vitro and in vivo bioimaging
- Long-term bioimaging with a stable bioluminescent signal
- Bioluminescence resonance energy transfer (BRET) technologies
- Codon-optimized gene reporters for both bacterial and mammalian expression systems
- His-tagged luciferases enable affinity purification and immunodetection
- Recombinantly produced and purified luciferases ready for use