



Non-Confidential Technology Disclosure

- Title:** Red-shifting the emission wavelength of luciferases
- Investigator:** Stephen Miller, Ph.D., Department of Biochemistry and Molecular Pharmacology, University of Massachusetts Medical School
- Description:** This invention describes novel luciferases that fluoresce in the near-IR range. Firefly luciferase is widely used for bioluminescent imaging in mice. However, when combined with firefly luciferin, the emitted yellow-green light (560nm) penetrates poorly through tissue due to absorption by hemoglobin and Rayleigh scattering. For optimal bioluminescent imaging, longer wavelengths (>650nm) are needed. Dr. Miller has created novel luciferase constructs to shift the light output of firefly luciferase to the near-IR. By shifting the luciferase output to the near-IR, tissue penetration is greatly improved. Dr. Miller has achieved ~80% efficient energy transfer from a tetracysteine-tagged luciferase to the bis-arsenical dye ReAsH, red-shifting the emission maximum of firefly luciferase by ~50nm to 608nm, an unprecedented level which increases reporter gene expression to at least an order of magnitude greater than what is currently available.
- Application:** This invention may be utilized for:
- Bioluminescence imaging in small animals with greater sensitivity and depth penetration
 - Multiplexing of luciferase reporter gene assay signals for drug screening and biological assays.
- Advantage:** The modified luciferases:
1. Allow near-IR light emission for optical imaging of reporter gene expression in living subjects with at least an order of magnitude greater sensitivity than is currently available.
 2. Allow more rapid image acquisition, imaging of smaller numbers of cells, and improvement in the imaging of organs that are located deeper in the body cavity.
- Patent Status:** Patent pending
- Licensing Status:** Available to license
- Docket:** UMMC 06-51
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