



Non-Confidential Technology Disclosure

- Title:** Red-shifting of luciferase emission with modified luciferins
- Investigator:** Stephen Miller, Ph.D., Department of Biochemistry and Molecular Pharmacology, University of Massachusetts Medical School
- Description:** This invention describes novel luciferin substrates that shift the emission of firefly luciferase toward the near-IR. 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 discovered that by altering the luciferin chromophore from firefly luciferase, the light emission was significantly shifted to the red at a maximum of 624nm. This is the most red-shifted luciferase emission ever reported and will allow the optical image of reporter gene expression in living subjects with at least an order of magnitude greater sensitivity than is currently available. This invention describes modified luciferins for shifting the emission of firefly luciferase toward the near-IR and methods for making the N-substituted animo luciferins.
- Application:** This invention may be utilized for:
- Modifying the luciferin chromophore to increase red-shifting of luciferase.
 - In vivo bioluminescence imaging in small animals.
 - Multiplexed luciferase-based cellular assays.
- Advantage:** The modified luciferins:
1. Generate unprecedented red-shifting of luciferase emission.
 2. Allow both the red-shifting of luciferase emission to new wavelengths to most readily penetrate living tissue and the potential to design new luciferin/luciferase pairs for multiplexed bioluminescence assays in vivo and in vitro.
 3. Allow more rapid acquisition, imaging of smaller numbers of cells, and improvement in the imaging of cells in organs that are located deeper in the body cavity.
 4. Allow far-red/near-IR emission from current luciferase constructs.
- Patent Status:** Patent pending
- Licensing Status:** Available to license
- Docket:** UMMC 07-06
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