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# Shedding Light on the Biological Activity by Firefly Bioluminescence

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## Abstract

As a persistent sensitive, applicable and non-invasive approach on understanding in vivo biology that facilitates distinctive characteristics to be visualized, bioluminescence from firefly luciferase/luciferin system has been comprehensively applied for overseeing pathogen detection, tumor growth and response to therapy patterns of gene regulation, measuring protein–protein interactions and so on. Approximately, this bioluminescence system exclusively relies on the native substrate D-luciferin or its analogue, aminoluciferin which can emit realistic bioluminescent signal in the presence of firefly luciferase (Fluc), ATP, Mg<sup>2+</sup> and O<sub>2</sub>. Therefore, a large pool of light emitters, such as firefly luciferase substrates and luciferin-based bioluminescence probes, are demanded for various biological applications, such as probing or imaging biological processes. In the current lecture, the author will present his recent progress on developing firefly luciferase substrates and inhibitors, as well as caged-luciferin bioluminescence probes. It's anticipated that these firefly luciferin-based substrates, inhibitors and probes will contribute to the broad application of bioluminescence in life science research.

**Keywords:** Firefly bioluminescence, luciferin, bioluminescence imaging

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