



UNIVERSITY OF LEEDS

This is a repository copy of *Towards brighter bioluminescence: Synthesis and properties of rigid infra-luciferins*.

White Rose Research Online URL for this paper:
<http://eprints.whiterose.ac.uk/146117/>

Version: Accepted Version

Proceedings Paper:

Syed, AJ orcid.org/0000-0001-7983-0979 and Anderson, JC (2018) Towards brighter bioluminescence: Synthesis and properties of rigid infra-luciferins. In: Abstracts of papers of the American Chemical Society. 256th National Meeting of the American Chemical Society, 19-23 Aug 2018, Boston, USA. American Chemical Society .

© 2018, American Chemical Society. This is an author produced version of an abstract published in 256th National Meeting of the American Chemical Society. Uploaded in accordance with the publisher's self-archiving policy

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.



eprints@whiterose.ac.uk
<https://eprints.whiterose.ac.uk/>

Abstract for the 256th National Meeting of the American Chemical Society – 19 – 23 Aug
2018

Aisha J. Syed and James C. Anderson

Department of Chemistry, University College London, WC1H 0AJ

Title: Towards brighter bioluminescence: Synthesis and properties of rigid infra-luciferins

Bioluminescence is produced by the luciferin-luciferase reaction in the bodies of fireflies. Firefly bioluminescence has found many applications in research such as in reporter assays, and *in-vivo* imaging.

The native luciferin-luciferase reaction produces light of wavelength 558 nm. Research in oncology and regenerative medicine requires nIR (650 – 1000 nm) probes as blood and tissue adsorb light of ≤ 600 nm. In recent years, many efforts have been devoted to the development of bright nIR luciferin probes with limited success. Our group has previously reported Infra-luciferin; a synthetic luciferin that is one of the most red-shifted luciferin to-date ($\lambda_{\text{max}} = 706$ nm). Like other analogues infra-luciferin is also dimmer than D-luciferin. The loss in brightness is most likely due to radiation less decay caused by amongst other things, rotation around single bonds. In this project we investigated whether making rigid infra-luciferin structures would improve the quantum yield of the bioluminescence reaction.

A rationally designed modification of infra-luciferin resulted in the development of a novel series of rigid infra-luciferin structures bearing pyridobenzimidazole and dibenzothiophene scaffolds and their non-rigid counterparts bearing benzimidazole and benzothiophene scaffolds. In-silico docking studies into *Photinus pyralis* luciferase were carried out to determine the suitability of the proposed analogues. This presentation will focus on the design, synthesis and biological activity of these structures. Preliminary results indicate that the rigid compounds are brighter than their non-rigid counterparts. Studies are currently underway to understand the mechanism of light output using DFT calculations and inspecting the co-crystal of infra-luciferin with luciferase. Our work is the first example of its kind that explores the effect of conformational restraint on infra-luciferin structures.

