Literature Report

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Date: 2020-01-09

Literature Source

JACS
JOURNAL OF THE AMERICAN CHEMICAL SOCIETY
Communication
Cite This: J. Am. Chem. Soc. XXXX, XXX, XXX–XXX
pubs.acs.org/JACS

A Photoactivatable Formaldehyde Donor with Fluorescence Monitoring Reveals Threshold To Arrest Cell Migration

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Jefferson Chan (University of Illinois)

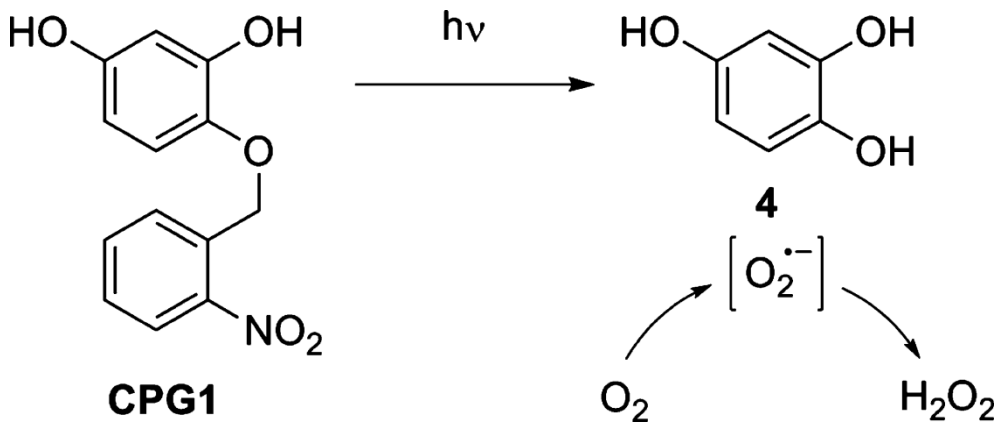
★ **Photoacoustic Imaging** (bioorthoganol chemical probes)

★ **Infectious Diseases** (small-molecule inhibitors)

★ **Neurological Disorders** (chemical and protein-based probes)

Introduction

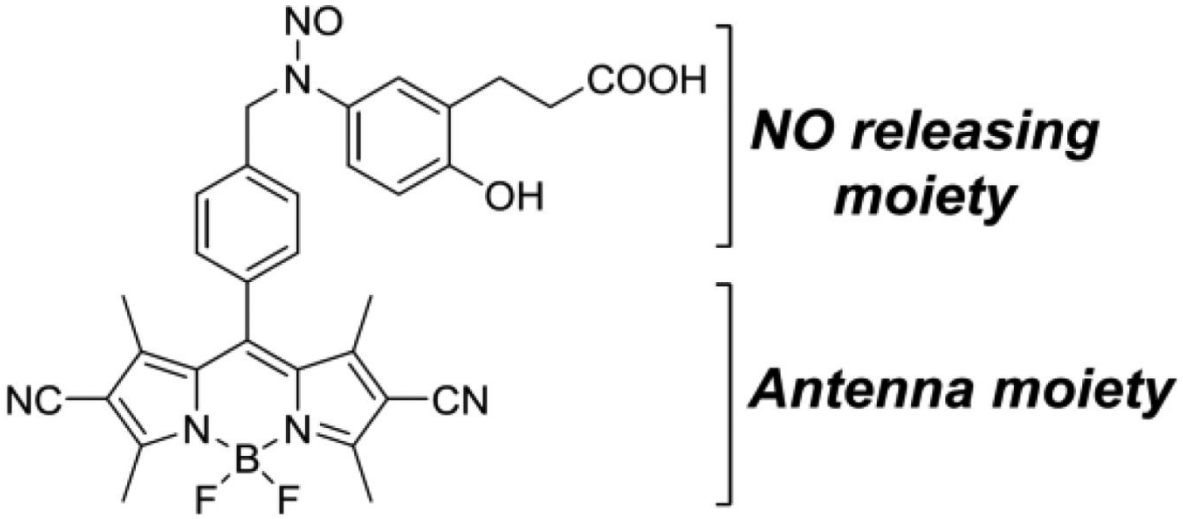
1. Photoactivatable donors for reactive oxygen



Scheme 1. Photolysis of CPG1 Releases 1,2,4-Trihydroxybenzene(**4**), which Sequentially Reduces Molecular Oxygen to Give H_2O_2 via a Superoxide Intermediate

J. Am. Chem. Soc. 2010, *132*, 17071–17073

2. for reactive nitrogen



NOBL-1 (1)

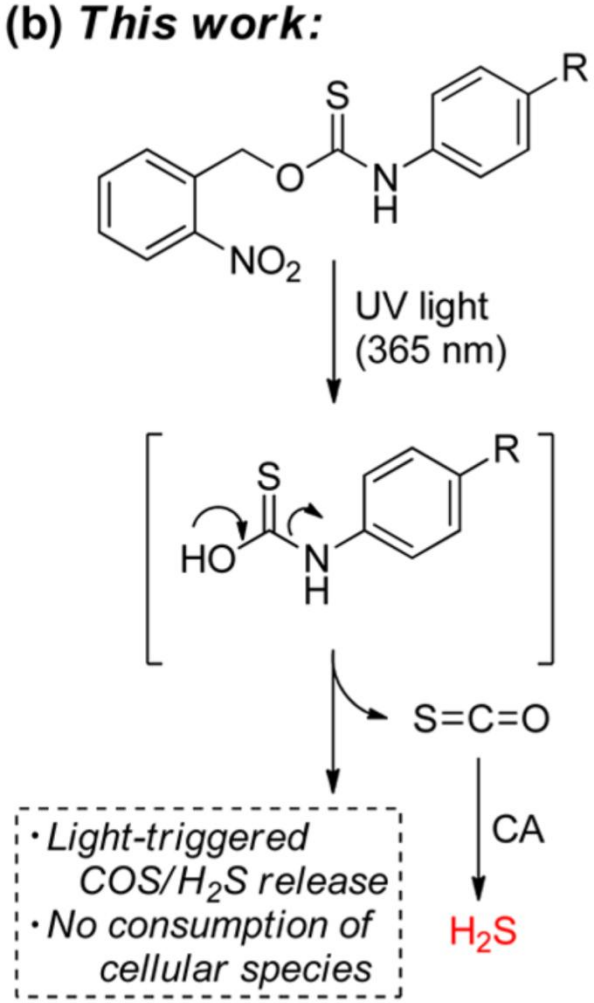
(***NO*** releaser triggered by ***B***lue ***L***ight)

Figure 1. Design of a blue-light-controllable NO releaser, NOBL-1**(1)**.

J. Am. Chem. Soc. 2014, 136, 7085-7091

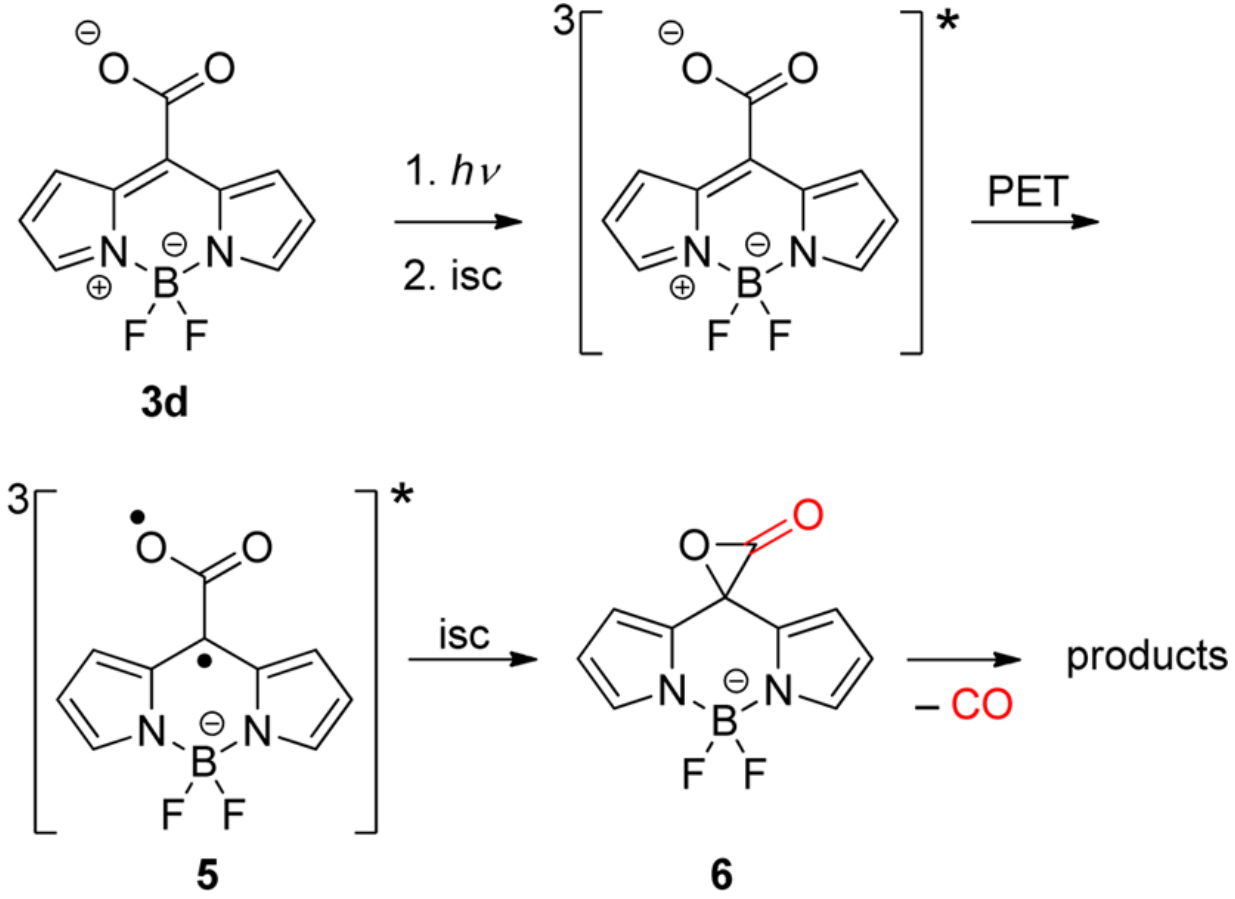
Introduction

3. for reactive sulfu



Org. Lett. 2017, 19, 2278-2281

4. for carbonyl species

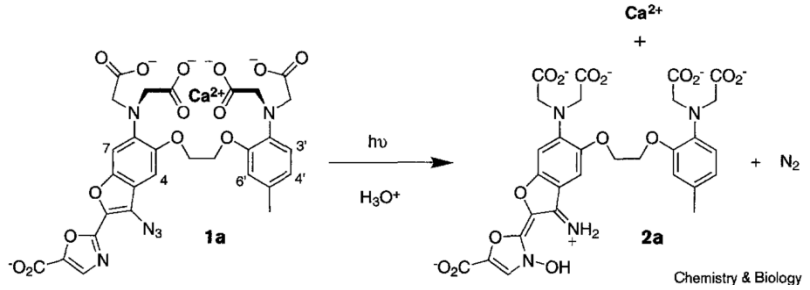


Scheme 2. Proposed Mechanism of COR-BDP Phototransformation To Release CO

J. Am. Chem. Soc. 2016, 138, 126-133

Introduction

5. for metal ions



Chemistry & Biology 1997, Vol 4 No 11

☆ This paper

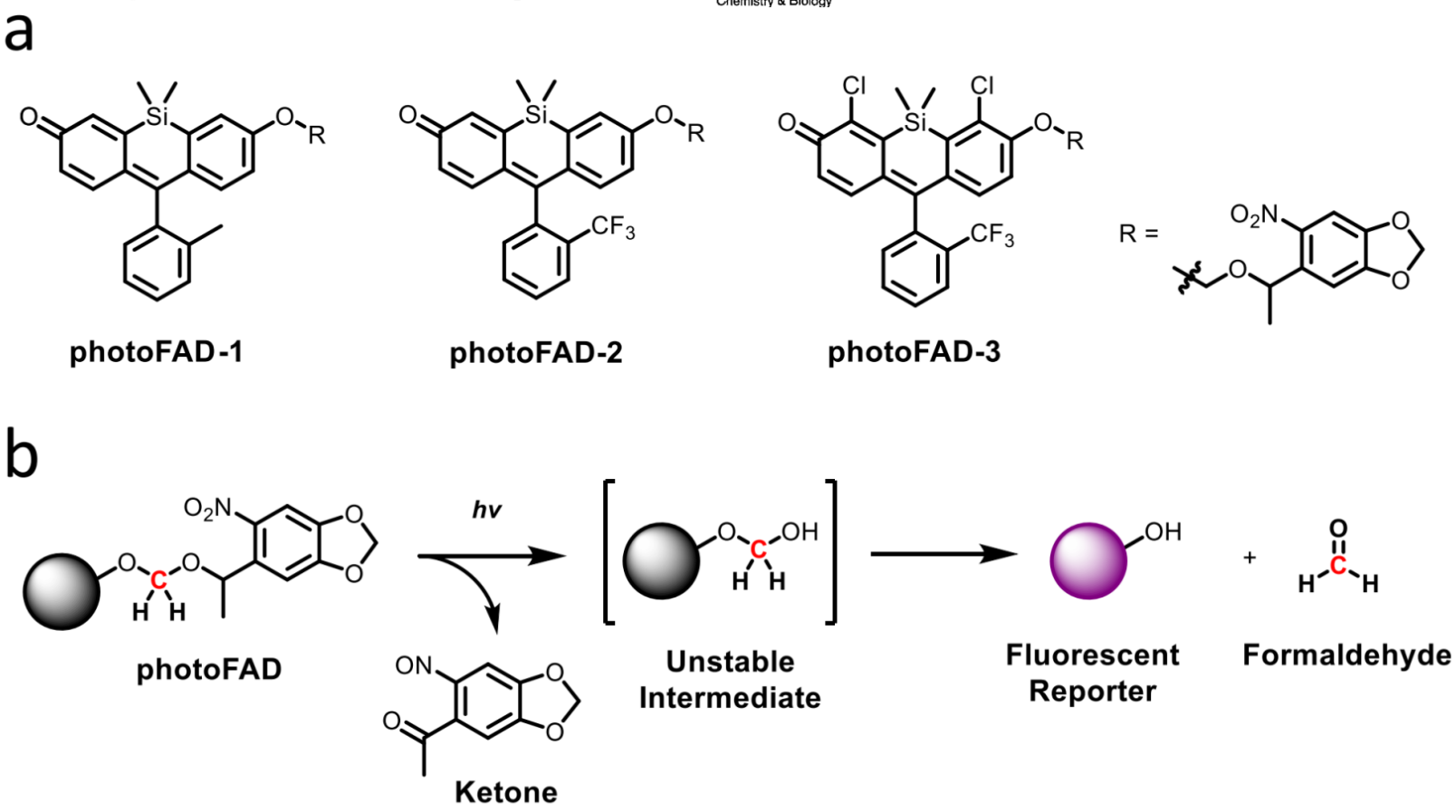


Figure 1. (a) Chemical structures of the photoFAD series. (b) Mechanism of light-mediated FA release.

Result and Discussion

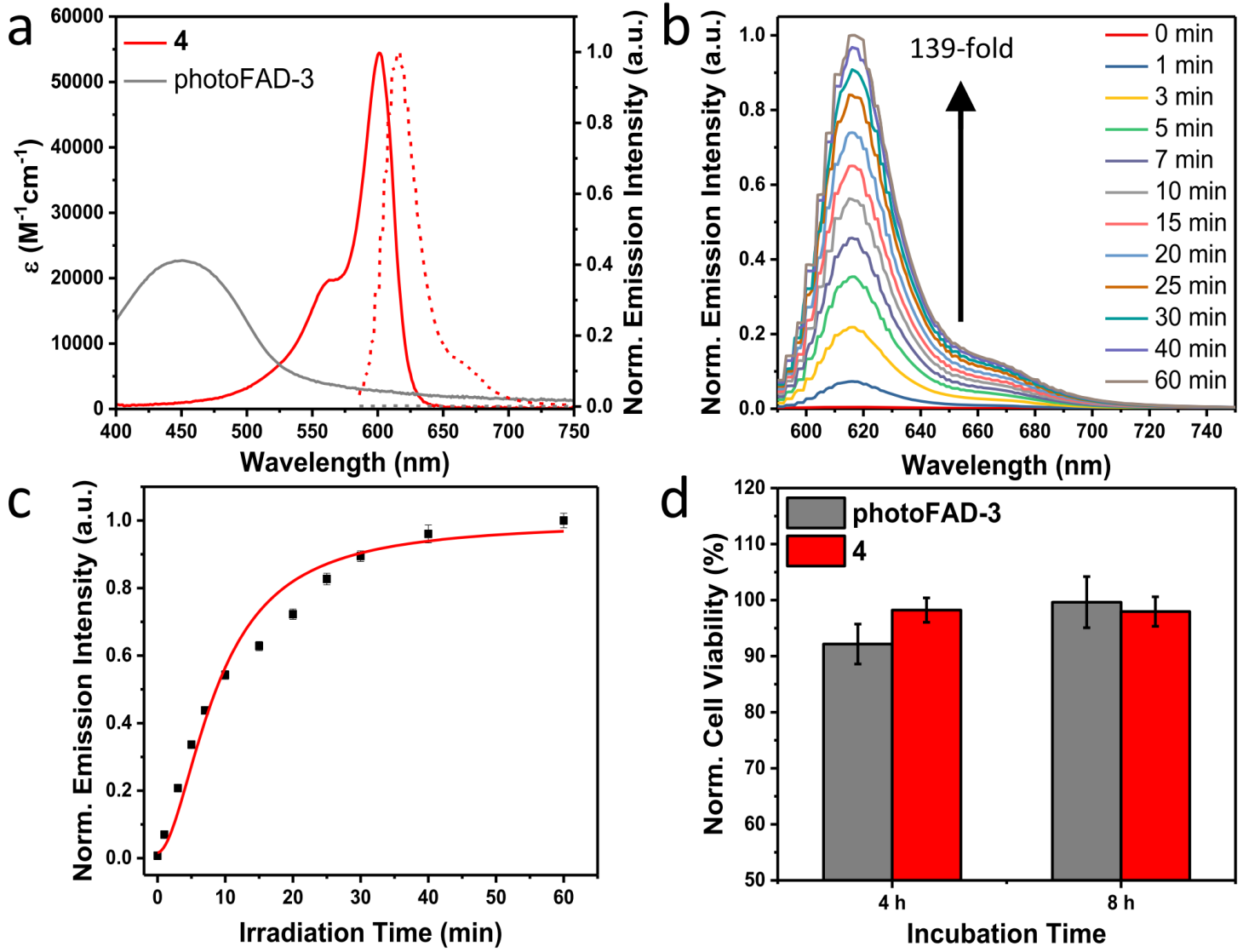


Figure 2. (a) Absorbance (solid) and emission (dashed) spectra of 2 µM photoFAD-3 and **4**. (b) Emission spectra and (c) release kinetics of photoFAD-3 upon photoactivation over 60 min. (d) Cytotoxicity assay of HEK293 cells stained with 4 µM photoFAD-3 and **4** for 4 and 8 h. Cell viability was normalized to a vehicle control. Data are represented as mean ± SD (n = 3).

Result and Discussion

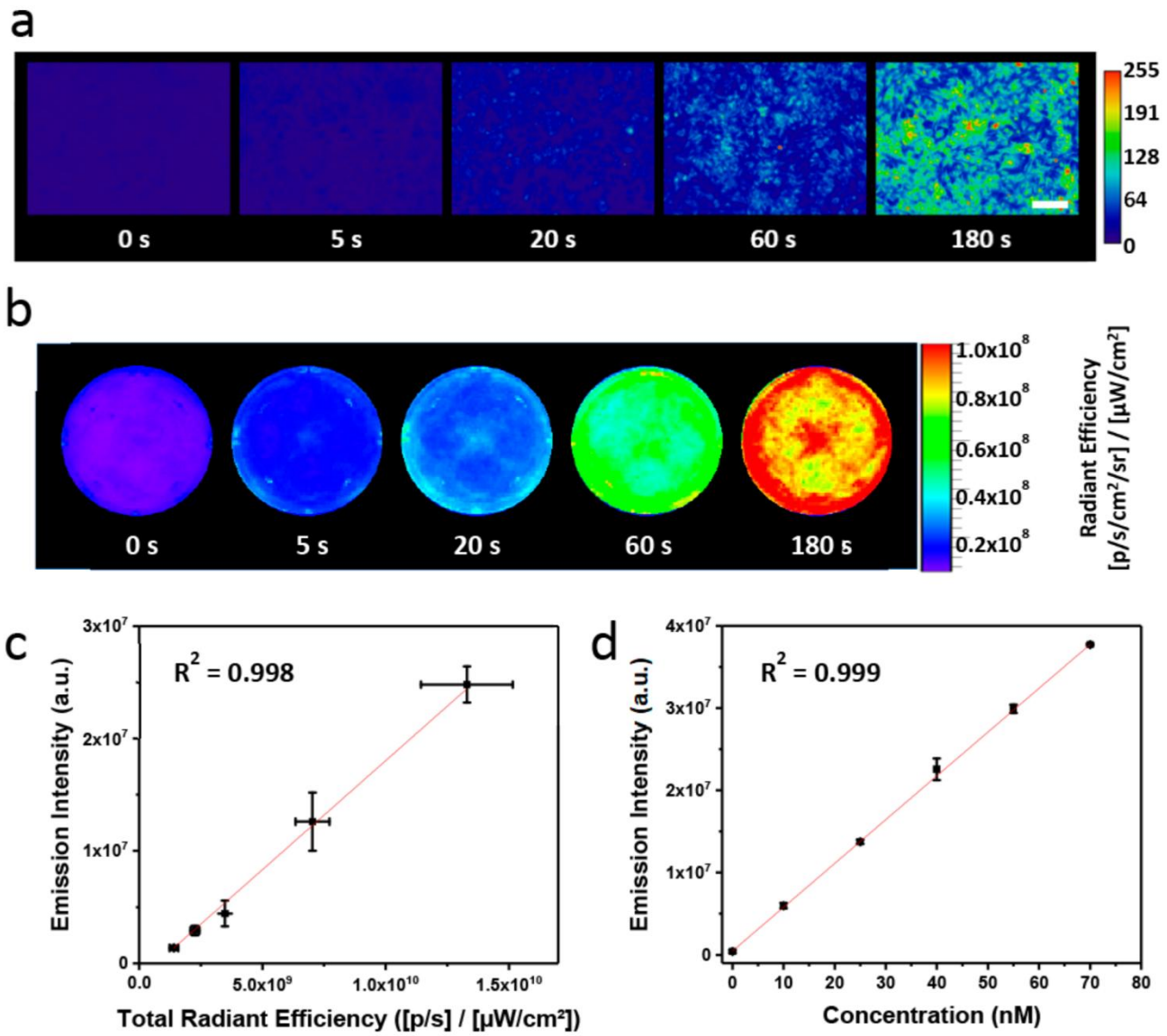
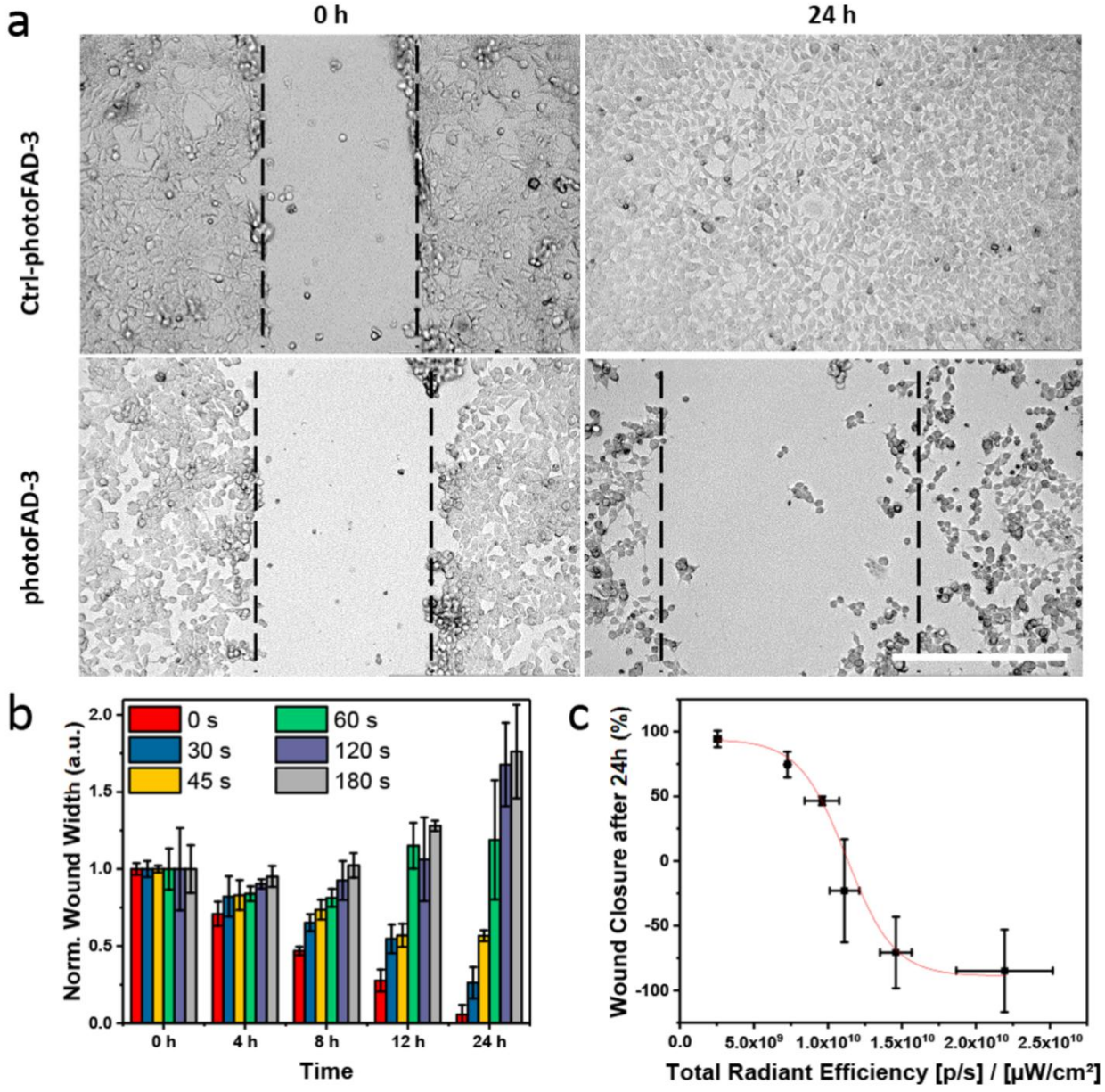
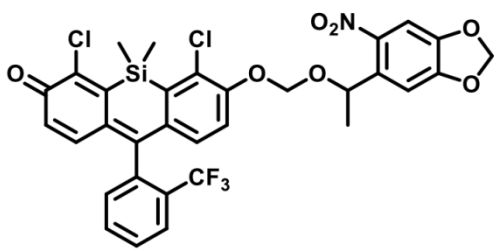


Figure 3. (a) Epifluorescence and (b) IVIS images of HEK293 cells stained with photoFAD-3 after 0, 5, 20, 60, and 180 s of photoactivation. Scale bar represents 100 µm. (c) Correlation plot of in vitro cell lysate fluorescence versus total radiant efficiency. (d) Reference plot of in vitro fluorescence versus concentration of **4**. Data are represented as mean ± SD (n = 3).

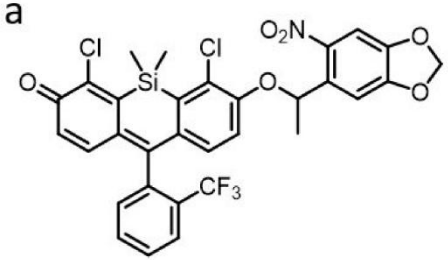
Result and Discussion





photoFAD-3

a



Ctrl-photoFAD-3

Figure 4. Wound healing assay of HEK293 cells upon treatment with 5 µM Ctrl-photoFAD-3 or photoFAD. (a) Microscopy images at 0 and 24 h after 180 s irradiation. Scale bar (white) represents 400 µm.
(b) Dose-dependent release of FA and the impact on wound healing over 24 h for photoFAD-3.
(c) Correlation plot of total radiant efficiency versus wound closure after 24 h. Data are represented as mean ± SD (n = 3).

FA concentrations below 2.2 µM per cell did not significantly affect recovery

Thank you!