

Accepted Manuscript

Title: Ratiometric Fluorescence Detection of Hydroxyl Radical Using Cyanine-Based Binary NanoGUMBOS

Authors: Mingyan Cong, Noureen Siraj, Nimisha Bhattarai, Paulina E. Kolic, Kevin S. McCarter, Pratap K. Chhotaray, Isiah M. Warner



PII: S0925-4005(17)32003-8
DOI: <https://doi.org/10.1016/j.snb.2017.10.101>
Reference: SNB 23405

To appear in: *Sensors and Actuators B*

Received date: 24-4-2017
Revised date: 16-10-2017
Accepted date: 17-10-2017

Please cite this article as: Mingyan Cong, Noureen Siraj, Nimisha Bhattarai, Paulina E.Kolic, Kevin S.McCarter, Pratap K.Chhotaray, Isiah M.Warner, Ratiometric Fluorescence Detection of Hydroxyl Radical Using Cyanine-Based Binary NanoGUMBOS, *Sensors and Actuators B: Chemical* <https://doi.org/10.1016/j.snb.2017.10.101>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Ratiometric Fluorescence Detection of Hydroxyl Radical Using Cyanine-Based Binary NanoGUMBOS

Mingyan Cong^a, Noreen Siraj^b, Nimisha Bhattarai^a, Paulina E. Kolic^a, Kevin S. McCarter^c, Pratap K. Chhotaray^a, and Isiah M. Warner^{a,*}

a. Chemistry Department, Louisiana State University, Baton Rouge, LA, 70803, United State

Tel: +1 225-578-2829; Fax: +1 225-578-3971; E-mail: iwarner@lsu.edu

b. Department of Chemistry, University of Arkansas at Little Rock Little Rock, AR, 72204, United State

c. Department of Experimental Statistics, Louisiana State University, Baton Rouge, LA. 70803, United State

Highlights

- A sensitive and selective nanoprobe for hydroxyl radicals was prepared via simple synthesis
- FRET enables measurement of ratiometric fluorescence and reduces errors introduced by environmental factors.
- Hydroxyl radicals can be quantitatively determined with a linear calibration curve.
- Confocal fluorescence imaging shows that the novel cyanine-based binary nanoGUMBOS probe is suitable for ratiometric detection of hydroxyl radicals produced in living cells.

Abstract

Overproduction of reactive oxygen species (ROS) results in oxidative stress, which is closely associated with pathogenesis of many diseases. Visualized detection of ROS in situ enables deeper insight into the mechanisms that underlie such pathological and physiological processes. Among reactive species, selective detection of hydroxyl radical is the most challenging, due to high aggression and short life time of this specie. In this regard, we have developed a sensitive and selective ratiometric fluorescence nanoprobe for detection of hydroxyl radical. This probe is based on use of GUMBOS (a Group of Uniform Materials Based on Organic Salts) that are derived from 1,1'-diethyl-2,2'-cyanine iodide and 1,1'-diethyl-2,2'-carbocyanine iodide. Each GUMBOS exhibit different reactivity towards reactive species. Without any chemical linkage, these two GUMBOS were combined into a single nanomaterial to produce a ratiometric fluorescent sensing profile through Förster resonance energy transfer. This cyanine-based ratiometric nanoprobe exhibited high selectivity for the hydroxyl radical in comparison to other ROS, including superoxide anion, singlet oxygen, hydrogen peroxide, and peroxyxynitrite. Furthermore, detection of hydroxyl radical was successfully demonstrated by use of these binary nanoGUMBOS in vitro using hormone-independent human breast adenocarcinoma cells (MDA-MB-231).

Keywords: Ratiometric fluorescence sensor; Organic salts; Reactive oxygen species; Hydroxyl radical detection;

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات