Reduced Cyanine Dyes (#4430)

This technology is a new class of highly effective and easily accessible probes for intracellular reactive oxygen species

Inventors at Georgia Tech and Emory University have engineered a new class of highly effective and easily accessible probes for the detection of intracellular reactive oxygen species. These reduced compounds have been shown to detect superoxide or hydroxyl radicals in nanomolar concentrations. This technology also can possibly detect ROS with high sensitivity in cell culture. Reduced dyes including, but not limited to, hydrocyanines, deuterocyanines, and/or other hydro- or deuterated dyes, such as deuterated leuco dyes, capable of detecting one or more reactive oxygen species, are described herein. The reduced dyes are generally prepared by reducing the oxidized dye with a reducing agent, such as sodium borohydride or sodium borodeuteride. For example, hydrocyanines and deuterohydroethydium (D-DHE or DDE) can be synthesized from cyanine dyes via a one-step reduction using a reducing agent, such as sodium borohydride ($NaBH_4$) or sodium borodeuteride ($NaBD_4$).

Benefits/Advantages

- **Simple Synthesis** - Easy one-step synthesis from commercially available cyanine dyes
- **Dependable** - Exceptional sensitivity
- **Versatile** - High stability and wide range wavelength tunability

Potential Commercial Applications

- Diagnostics
- Non-therapeutics
- Cell Culture
- In Vivo imaging

Background/Context for This Invention

Certain reactive oxygen species (ROS) play a central role in biology and medicine for their role in regulating cell signaling pathways and the development of oxidative stress leading to numerous inflammatory diseases. The lack of effective ROS sensing imaging probes has led to a limitation of their use in biology and application for disease diagnosis. There is a need to develop a molecular probe for the detection of ROS in cell cultures and in vivo.

Niren Murthy
Assistant Professor - Georgia Tech Department of Biomedical Engineering

W. Robert Taylor
Professor – Emory University

Kousik Kindu
Postdoctoral Fellow - Georgia Tech Department of Biomedical Engineering

Sungmun Lee
Research Scientist - Georgia Tech Department of Biomedical Engineering

Sarah J. Knight
Postdoctoral Fellow - Emory University School of Medicine

More Information

International Patent Issued - 8628753

Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/reduced-cyanine-dyes

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot