OPTICAL PROBES FOR BIOLOGICAL HYDROGEN PEROXIDE

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ABSTRACT

A new class of fluorescent probes for hydrogen peroxide, known as the Peroxysensor family, has been developed by UC Berkeley researchers. These reagents utilize a boronate deprotection mechanism to provide high selectivity and optical dynamic range for detecting H2O2 in aqueous solution over similar reactive oxygen species (ROS) including superoxide, nitric oxide, tert-butyl hydroperoxide, and hydroxyl radical.

Peroxyresorufin-1 (PR1), Peroxyfluor-1 (PF1), and Peroxyxanthone-1 (PX1) are first-generation probes that respond to H2O2 by an increase in red, green, and blue fluorescence, respectively. The boronate dyes are cell-permeable and can detect micromolar changes in H2O2 concentrations in living cells, including hippocampal neurons, using confocal and two-photon microscopy.

The unique combination of ROS selectivity, membrane permeability, and a range of available excitation/emission colors establishes the value of PR1, PF1, PX1, and related probes for interrogating the physiology and pathology of cellular H2O2. The value of these probes has been demonstrated by measuring changes in intracellular H2O2 within living mammalian cells.

These compounds can be used as probes in a variety of disciplines such as microscopy, enzymology, clinical chemistry, histochemistry, molecular biology and medicine, as well as diagnostic agents in imaging methods, such as magnetic resonance imaging, positron emission tomography, near infrared imaging and the like.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,791,258	07/29/2014	2005-077
United States Of America	Issued Patent	7,842,823	11/30/2010	2005-077

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