oxidized by various reactive oxygen species within the local environment of the fluorescent molecule. Any number of potential oxidants exist in the environment and atmosphere such as ozone, or may exist inside a living body ranging from humans to bacteria. Inside a living body, normal reactive oxygen species (ROS) can include those involved in typical healthy healing reactions such as peroxide, hydroxyl radicals, peroxynitrite, superoxide, and others. Inside a living system there are also specific enzymes called oxygenases for the specific purpose of oxidation in the breakdown of molecules. An adverse result of reactive oxygen species or oxygenase activity on a fluorescent molecule is typically loss of fluorescence. In the case of an indicator molecule, or a passive tag, probe, or label, the useful life and sensitivity of the device, or diagnostic, is limited, or may be rendered completely ineffective by oxidative degradation of fluorescent signal. Therefore, there remains a need for fluorescent molecules that have increased resistance to oxidation.

BRIEF SUMMARY OF THE INVENTION

In one aspect, the present ~~invention~~disclosure is directed to a method for using a molecule in oxidative conditions, which comprises:

a) obtaining a molecule having an aryl boronic acid residue having one or more electron withdrawing groups on the aromatic moiety which contains the boronic acid residue, such that the molecule has enhanced oxidation resistance as compared to a corresponding molecule without the one or more electron withdrawing groups; and

b) subjecting the molecule having the one or more electron withdrawing groups to oxidative conditions.

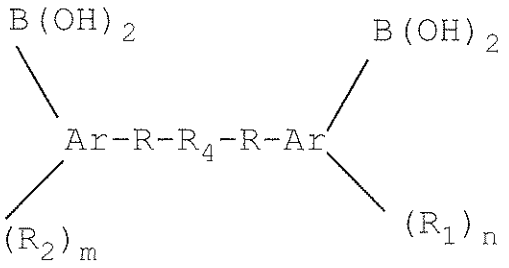
In another aspect, the present ~~invention~~disclosure is directed to a method for detecting the presence or concentration

of an analyte in a sample in an oxidative environment, said method comprising:

a) exposing the sample to an indicator molecule having a detectable quality that changes when the indicator molecule is exposed to the analyte, said molecule comprising an aryl boronic acid residue having one or more electron withdrawing groups on the aromatic moiety which contains the boronic acid residue, such that the indicator molecule has enhanced oxidation resistance as compared to the corresponding molecule without the one or more electron withdrawing groups; and

b) measuring any change in said detectable quality to thereby determine the presence or concentration of said analyte in said sample.

In another aspect, the present ~~invention~~disclosure is directed to a compound having the following structure:



(I)

wherein:

-each Ar is an aryl group;

-each R_1 and R_2 are the same or different and are an electron withdrawing group;

-m and n are each independently integers from 1 to 10;

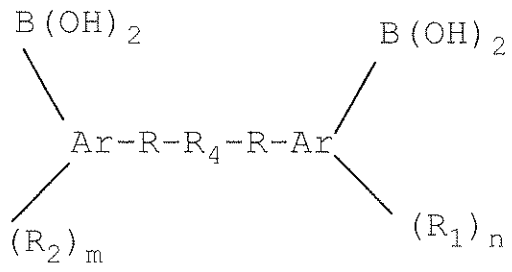
-R_4 is a detectable moiety; and

-each R is independently a linking group having from zero to ten contiguous or branched carbon

and/or heteroatoms, with at least one R further containing a polymerizable monomeric unit;

and wherein the compound has enhanced oxidation resistance as compared to the corresponding compound without the one or more electron withdrawing groups.

In another aspect, the present ~~invention~~disclosure is directed to a compound having the following structure:



wherein:

-each Ar is an aryl group other than phenyl;

-each R_1 and R_2 are the same or different and are an electron withdrawing group;

-m and n are each independently integers from 1 to 10;

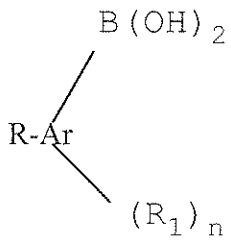
-R_4 is a detectable moiety; and

-each R is independently a linking group having from zero to ten contiguous or branched carbon and/or heteroatoms, with at least one R ~~further~~ containing a linking group capable of attachment to a solid support or a polymeric matrix;

and wherein the compound has enhanced oxidation resistance as compared to the corresponding compound without the one or more electron withdrawing groups.

In another aspect, the present ~~invention~~disclosure is directed to a method for the production of an indicator macromolecule for detecting the presence or concentration

In another aspect, the present ~~invention~~disclosure is directed to a compound having the following structure:



(II)

wherein:

-Ar is an aryl group;

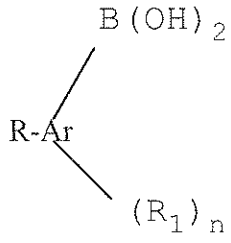
-each R_1 is the same or different and is an electron withdrawing group;

-n is an integer from 1 to 10; and

-R is a linking group having from zero to ten contiguous or branched carbon and/or heteroatoms, which linking group further contains a polymerizable monomeric unit and a detectable moiety;

and wherein the compound has enhanced oxidation resistance as compared to the corresponding compound without electron withdrawing group(s).

In another aspect, the present ~~invention~~disclosure is directed to a compound having the following structure:



wherein:

-Ar is an aryl group;

-each R_1 is the same or different and is an electron withdrawing group;

-n is an integer from 1 to 10; and