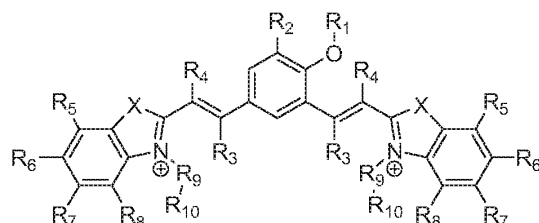


WE CLAIM:

1. A compound of Formula I



Formula I

wherein, 'X' is selected from a group comprising oxygen, sulphur, and selenium;

'R₁' is selected from a group comprising alkyl chain, allyl group, aryl group, benzyl group, aryl and alkyl group, acid, amine, ester, methyl phenyl boronic acid, boronic ester, carbonate, phosphate, silane, quaternary ammonium, amide, imine and any other moiety which can be triggered by chemical or enzymatic tools;

'R₂' is selected from a group comprising H, OH, halogen, alkyl and substituted alkyl, and wherein, the halogen is selected from a group comprising bromide, chloride and iodide;

'R₃' or 'R₄' is selected from a group comprising H, alkyl, aryl, nitrile, acid and halogen, and wherein the halogen is selected from a group comprising, chloride, fluoride, bromide and iodide;

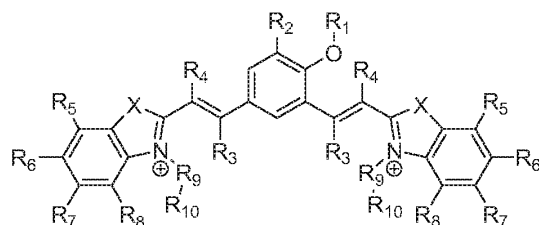
'R₅', 'R₆', 'R₇' or 'R₈' is selected from a group comprising H, OH, alkyl, aryl, halogen, nitro, sulfonates (SO₃⁻) and nitrile group;

'R₉' is selected from a group comprising H and -(CH₂)_n-, wherein 'n' is 1-6;

'R₁₀' is selected from a group comprising hydrogen, -OH, methyl, amine, terminal alkyne, alkene, alkyl acid, amine acid and sulfonates (SO₃⁻);

or its salt, derivative, tautomer, isomer, polymorph, analog, solvate or intermediate thereof.

2. The compound of claim 1, wherein the compound is a stimuli responsive probe and detects reactive oxygen species (ROS).
3. A process for preparation of compound of Formula I:



Formula I

wherein, 'X' is selected from a group comprising oxygen, sulphur, and selenium;

'R₁' is selected from a group comprising alkyl chain, allyl group, aryl group, benzyl group, aryl and alkyl group, acid, amine, ester, methyl phenyl boronic acid, boronic ester, carbonate, phosphate, silane, quaternary ammonium, amide, imine and any other moiety which can be triggered by chemical and enzymatic tools;

'R₂' is selected from a group comprising H, OH, halogen, alkyl and substituted alkyl, and wherein, the halogen is selected from a group comprising bromide, chloride and iodide;

'R₃' or 'R₄' is selected from a group comprising H, alkyl, aryl, nitrile, acid and halogen, and wherein the halogen is selected from a group comprising, chloride, fluoride, bromide and iodide;

'R₅', 'R₆', 'R₇' or 'R₈' is selected from a group comprising H, OH, alkyl, aryl, halogen, nitro, sulfonates (SO₃⁻) and nitrile group;

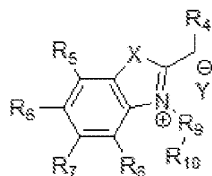
'R₉' is selected from a group comprising H and -(CH₂)_n-, wherein 'n' is 1-6;

'R₁₀' is selected from a group comprising hydrogen, -OH, methyl, amine, terminal alkyne, alkene, alkyl acid, amine acid and sulfonates (SO₃⁻);

or its salt, derivative, tautomeric form, isomer, polymorph, analog, solvate or intermediates thereof;

said process comprising:

- a. reacting compound of Formula II with compound of Formula III to obtain compound of Formula IV



Formula IV

wherein,

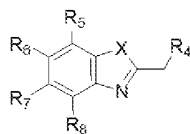
'R₄' is selected from a group comprising H, alkyl, aryl, nitrile, acid and halogen, and wherein the halogen is selected from a group comprising, chloride, fluoride, bromide and iodide;

'R₅', 'R₆', 'R₇' or 'R₈' is selected from a group comprising H, OH, alkyl, aryl, halogen, nitro, sulfonates (SO₃⁻) and nitrile group;

'R₉' is selected from a group comprising H and -(CH₂)_n-, wherein 'n' is 1-6; and

'R₁₀' is selected from a group comprising hydrogen, -OH, methyl, amine, terminal alkyne, alkene, alkyl acid, amine acid and sulfonates (SO₃⁻);

'Y' is either Br or I;

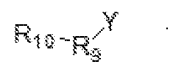


Formula II

wherein,

'R₄' is selected from a group comprising H, alkyl, aryl, nitrile, acid and halogen, and wherein the halogen is selected from a group comprising, chloride, fluoride, bromide and iodide; and

'R₅', 'R₆', 'R₇' or 'R₈' is selected from a group comprising H, OH, alkyl, aryl, halogen, nitro, sulfonates (SO₃⁻) and nitrile group;



Y = Br or I

Formula III

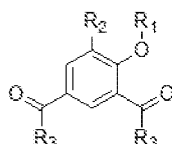
wherein,

'R₉' is selected from a group comprising H and -(CH₂)_n-, wherein 'n' is 1-6;

'R₁₀' is selected from a group comprising hydrogen, -OH, methyl, amine, terminal alkyne, alkene, alkyl acid, amine acid and sulfonates (SO₃⁻);

and,

- b. reacting the compound of Formula IV with compound of Formula V in presence of piperidine and alcohol.



Formula V

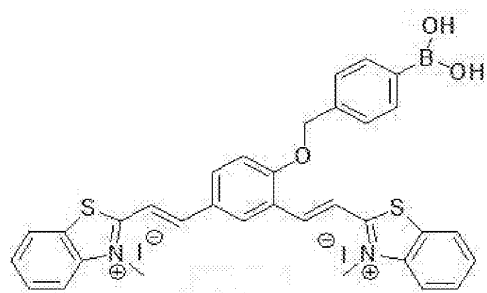
wherein,

'R₁' is hydrogen;

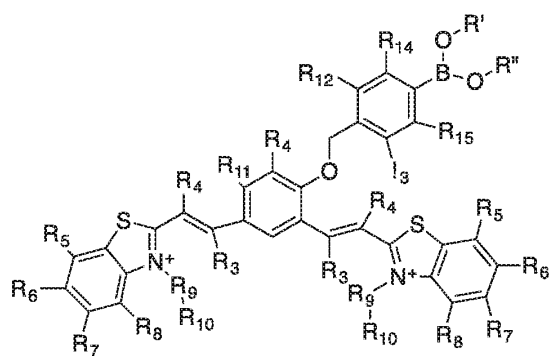
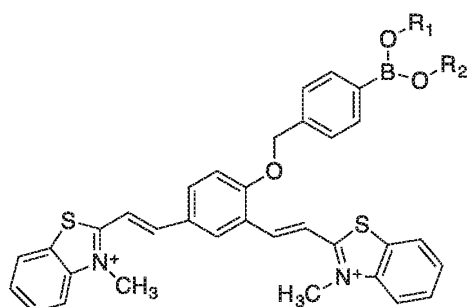
'R₂' is selected from a group comprising H, OH, halogen, alkyl and substituted alkyl, and wherein, the halogen is selected from a group comprising bromide, chloride and iodide; and

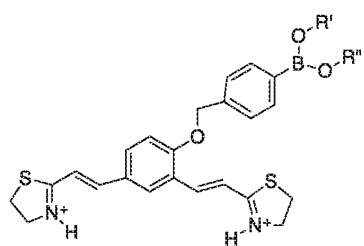
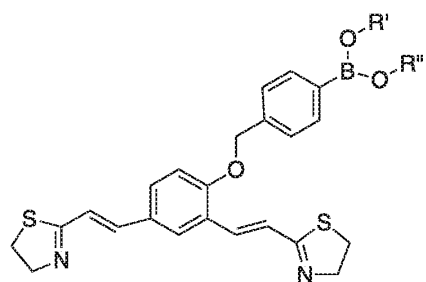
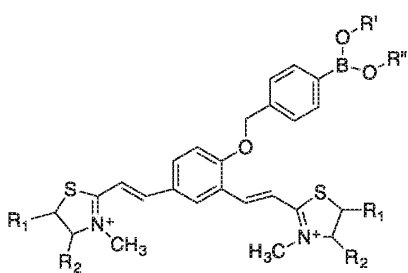
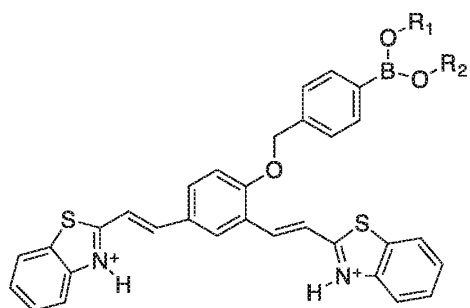
'R₃' is selected from a group comprising H, alkyl, aryl, nitrile, acid and halogen, and wherein the halogen is selected from a group comprising, chloride, fluoride, bromide and iodide;

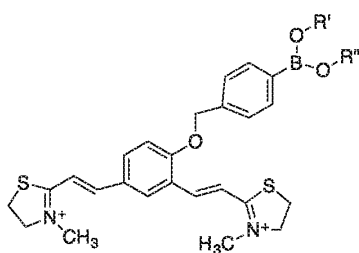
4. A compound of Formula I according to claim 1 selected from



QCy-BA







R_1 to R_{14} or R' and R'' are independently selected from a group comprising alkyl, aryl, alicyclic, heterocyclic, heteroatom selected from a group comprising O, N, P, S, halogens, cyclic, acyclic ring system.

5. The process as claimed in claim 3, wherein the compound 4-((N,N-dimethyl,2,4-bis((E)-2-(benzo[d]thiazol-2-ylinium)vinyl)phenoxy)methyl)phenylboronic acid [QCy-BA] is prepared by:
 - a. reacting 2-methyl benzothiazole with methyl iodide to obtain N-methyl-2-methylbenzothiazole; and
 - b. reacting the N-methyl-2-methylbenzothiazole with 4-(4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)benzyloxy)isophthalaldehyde in presence of piperidine and ethanol.
6. The process as claimed in claim 3 or claim 5, wherein said process is carried out at a temperature ranging from about 30 °C to 80°C, and for a time period ranging from about 2 hours to 24 hours.
7. The process as claimed in claim 3 or claim 5, wherein the steps a) and b) further comprise isolation, purification or a combination thereof of the corresponding product; wherein said isolation and purification is carried out by acts selected from a group comprising addition of solvent, washing with solvent, quenching, filtration, extraction, chromatography and combinations thereof.
8. A pharmaceutical composition comprising the compound of Formula I or compound as claimed in claim 4 or its salt, derivative, tautomeric form, isomer, polymorph, analog, solvate

and intermediates thereof as claimed in claim 1, optionally along with at least one pharmaceutically acceptable excipient.

9. The pharmaceutical composition as claimed in claim 8, wherein the pharmaceutically acceptable excipient is selected from a group comprising adjuvant, diluent, carrier, granulating agents, binding agents, lubricating agents, disintegrating agent, sweetening agents, glidant, anti-adherent, anti-static agent, surfactant, anti-oxidant, gum, coating agent, coloring agent, flavouring agent, coating agent, plasticizer, preservative, suspending agent, emulsifying agent, plant cellulosic material, spheronization agent, other conventionally known pharmaceutically acceptable excipient or any combination of excipients thereof; and the composition is administered to a subject through modes selected from a group comprising intravenous administration, intramuscular administration, intraperitoneal administration, hepatoportal administration, intra articular administration and pancreatic duodenal artery administration, or any combination thereof.
10. A method of detecting or quantifying the presence of reactive oxygen species (ROS) in a biological sample, said method comprising the act of contacting the compound of Formula I as claimed in claim 1 or compound as claimed in claim 4 or its salt, derivative, tautomer, isomer, polymorph, analog, solvate or intermediates thereof, or the composition of claim 8 with the sample and detecting the fluorescence indicative of the presence of ROS in the biological sample.
11. The method as claimed in claim 10, wherein said ROS compound is selected from a group comprising hydrogen peroxide, tertbutyl hydroperoxide, superoxide, hydroxyl radical, tert-butoxy radical, hypochlorite and ONOO^- .
12. The method as claimed in claim 10, wherein the biological sample is cells, tissue, biological fluids, or combinations thereof.
13. A method for detecting or quantifying a ROS compound in vivo in a subject, said method comprising:
 - a. administering to a subject, a compound of Formula 1 or compound of claim 4;

- b. allowing said compound of Formula 1 or compound of claim 4 to react with a ROS;
and
 - c. detecting or quantifying the fluorescence, indicative of the presence of ROS compound in vivo.
14. The method of claim 13, wherein said detecting or quantifying further comprises detecting the location of ROS compound in said subject.
15. The method as claimed in claim 10 or claim 13, wherein the detection or quantifying is by technique selected from fluorescence microscopy, fluorescence spectroscopy, confocal laser scanning microscopy, total internal reflection fluorescence microscopy, Near infra-red fluorescence and combinations thereof.
16. The method as claimed in claim 10 or claim 13, wherein the compound of Formula I or the compound as claimed in claim 4 is provided as a combination probe with DNA sequences for detecting and quantifying the ROS, and wherein the DNA sequence is exogenous DNA or endogenous nuclear DNA, or a combination thereof.
17. The method as claimed in claim 10 or claim 13, wherein the compound in the presence of ROS is cleaved to release a fluorescent probe quinone cyanine-dithiazole (QCy-DT), which is capable of binding to the AT-rich DNA for fluorometric detection and quantification of the ROS.
18. A method of diagnosing a disease condition in a subject, said method comprising contacting the compound of Formula I as claimed in claim 1 or the compound as claimed in claim 4 or its salt, derivative, tautomer, isomer, polymorph, analog, solvate or intermediates thereof, or the composition of claim 8 with a sample obtained from the subject.
19. The method as claimed in claim 18, wherein the subject is a mammal or a plant, and wherein the sample from mammal is selected from group comprising blood, serum, in-vitro sample, synthetic sample, any bodily fluid and combinations thereof.

20. The method as claimed in claim 18, wherein the disease is selected from a group comprising cancer, cardiovascular dysfunction, neurodegenerative disease, gastroduodenal pathogenesis, inflammatory disorder, metabolic dysfunction of organ, premature aging, any disorder related to ROS, and combinations thereof.
21. The method as claimed in claim 18, wherein the disease is diagnosed by detecting and optionally quantifying reactive oxygen species (ROS) in the sample.
22. A method of inhibiting growth of a cell, said method comprising contacting the compound of Formula I as claimed in claim 1 or compound as claimed in claim 4 or its salt, derivative, tautomer, isomer, polymorph, analog, solvate or intermediates thereof, the composition of claim 8 with the cell.
23. The method as claimed in claim 23, wherein the cell is eukaryotic cell selected from a group comprising cancerous cells, cells infected with microorganisms, parasite or unicellular protozoan and other cells characterized by abnormal levels of ROS.
24. The method as claimed in claim 24, wherein the parasite is *Plasmodium*.
25. A method of treating a disease characterized by abnormal levels of ROS in a subject, said method comprising step of administering the compound of Formula I as claimed in claim 1 or compound as claimed in claim 4 or its salt, derivative, tautomer, isomer, polymorph, analog, solvate or its intermediates thereof, or the composition of claim 8 in said subject to treat the disease.
26. Use of compound of Formula I of claim 1 or compound as claimed in claim 4 or its salt, derivative, tautomer, isomer, polymorph, analog, solvate or intermediates thereof, or the composition of claim 8 as a probe for detecting and optionally quantifying ROS, diagnosing a disease caused by abnormal ROS levels, inhibiting growth of a cell, treating a disease characterized by abnormal levels of ROS.

27. A kit for detecting reactive oxygen species (ROS) in a sample, wherein the kit comprising the compound of formula 1 or compound of claim 4 or its salt, derivative, tautomer, isomer, polymorph, analog, solvate or intermediates thereof; or a composition of claim 8, wherein the said compound is present in an amount effective to detect the presence of ROS.