CLAIMS

1. An electrically non-conductive substrate having a layer of electrically conductive material thereon, wherein:

the conductive material is arranged into at least two, or a plurality of, strips on a surface of the substrate, the strips are spaced apart from each other, the distance between each adjacent strip independently is in the range of 2µm to 300µm, and the strips are alternately connected to positive and negative connections of a power supply~~,~~ so as to induce a voltage across the electrically conductive material layer between adjacent strips.

2. The substrate according to claim 1, wherein the voltage is in the range of 1V to 10V, preferably between 1V and 5V.

3. The substrate according to claim 1 or claim 2, wherein the conductive material comprises:

- at least one metal, optionally selected from silver, aluminium, zinc, copper, titanium, chromium, iron, platinum, palladium, tungsten, and gold, as well as mixtures, multilayer combinations and alloys thereof;
- photoactive metal nanoparticles, metal oxide nanoparticles, metal sensitised with photoactive dyes, and/or metal oxides sensitised with photoactive dyes;
- a metal oxide, optionally selected from nickel-, cobalt- and iron-based oxides, indium tin oxide and fluorinated tin oxide, and mixtures thereof;
- a doped metal oxide, optionally wherein the doped metal oxide is aluminium doped zinc oxide;
- graphite, graphene or carbon, for example carbon nanostructures such as carbon nanotubes; and/or
- nanoparticles.

4. The substrate according to claim 1 or claim 2, wherein the conductive material consists of:

- at least one metal, optionally selected from silver, aluminium, zinc, copper, titanium, chromium, iron, platinum, palladium, tungsten, and gold, as well as mixtures, multilayer combinations and alloys thereof;
- photoactive metal nanoparticles, metal oxide nanoparticles, metal sensitised with photoactive dyes, and/or metal oxides sensitised with photoactive dyes;
- a metal oxide, optionally selected from nickel-, cobalt and iron-based oxides, indium tin oxide and fluorinated tin oxide, and mixtures thereof;
- a doped metal oxide, optionally wherein the doped metal oxide is aluminium doped zinc oxide; and/or
- graphite, graphene or carbon, for example carbon nanostructures such as carbon nanotubes.

5. The substrate according to any one of claims 1 to 4, wherein the conductive material comprises a single layer or multilayers of conductive material.

6. The substrate according to any one of claims 1 to 5, wherein the conductive material is formulated as an ink.

7. The substrate according to any one of claims 1 to 6, wherein the conductive material layer is:

- substantially transparent, semi-transparent, or has an overall transparency of between about 50% and 99% in the visible spectrum, optionally wherein the conductive material layer is made of

nickel-, cobalt- and iron-based oxides, indium tin oxide, fluorinated tin oxide, aluminium doped zinc oxide; or

- substantially opaque, optionally wherein the conductive material layer is made of silver, aluminium, zinc, copper, titanium, iron, or gold.

8. The substrate according to any one of claims 1 to 7, wherein each strip of conductive material independently has a width in the range of 2µm to 300µm, or between about 0.01nm and 10nm, or in a range of between about 1 µm and about 5 µm, or in a range of between about 10 µm and about 200 µm, optionally having a width of less than about 5 µm.

9. The substrate according to any one of claims 1 to 8, wherein the strips of conductive material each have a thickness in the range of 5 nm to 1000 µm, preferably in the range of 500 nm to 500 µm, more preferably in the range of 1 µm to 100 µm, or in a range of between about 20 nm and about 500 nm, or in a range of between about 1 µm and about 10 µm.

10. The substrate according to any one of claims 1 to 9, wherein the strips of conductive material are interdigitated.

11. The substrate according to any one of claims 1 to 10, wherein the electrically conductive layer further comprises a hygroscopic component.

12. The substrate according to claim 11, wherein the hygroscopic component is selected from rock salt, silica sand, silica gel, $CaCl_2$, a hygroscopic polymer, or a glycosaminoglycan.

13. The substrate according to claim 11 or claim 12, wherein the hygroscopic component comprises an aqueous component, preferably water.

14. The substrate according to any one of claims 1 to 13, wherein the electrically conductive layer is partially or fully covered by a protective layer, optionally selected from epoxy or any non-conductive metal oxide such as aluminium oxide or silicon dioxide.

15. The substrate according to any one of claims 1 to 14, wherein the surface of the ~~insulator~~ substrate beneath the electrically conductive layer has been pre-treated with oxygen plasma or UV ozone, such that the surface tension of the surface of the insulator substrate is reduced.

16. The substrate according to any one of claims 1 to 15, wherein the power supply is a solar cell or a battery.

17. The substrate according to claim 16, wherein the solar cell is an organic or amorphous silicon solar cell, preferably wherein the solar cell is an OPV (organic photovoltaic), a DSSC (Dye-sensitised solar cells), a copper indium gallium selenide (CIGS) solar cell, or a flexible silicon solar cell.

18. The substrate according to claim 16, wherein the battery has a thickness in the range of 1 mm to 10 mm, or in the range of 10 µm to 100 µm.

19. The substrate according to any one of claims 1 to 18, wherein the electrically non-conductive substrate is:

- flexible, optionally wherein the electrically non-conductive substrate is a polymeric adhesive film, fabric, plastic, paper, fibres, or amorphous silicon, or
- non-flexible, optionally wherein the insulator substrate is glass, plastic, or ceramic.

20. An article of manufacture comprising the electrically non-conductive substrate according to any one of claims 1 to 19.

21. The article of manufacture according to claim 20, wherein the article of manufacture is selected from an electronic device such as a tablet or mobile phone, a touchscreen, a keypad, a keyboard, a button, a handle, a screen protector, a piece of furniture such as a seat, a table, an arm rest, a toilet seat, a cup, a worktop, and an appliance, such as a kitchen appliance, a door plate, a water tap, a car steering wheel, a car key, food packaging, stationary, and a bank note.

22. Use of the electrically non-conductive substrate as defined in any one of claims 1 to 19, or the article of manufacture as defined in claim 20 or claim 21, for inactivating a germ.

23. Use according to claim 22, wherein the germ is a virus, a bacterium, or a fungus.

24. Use according to claim 23, wherein the virus is a coronavirus such as Sars-CoV-2, a flu virus, HPV, HIV, or norovirus.