## CLAIMS

1. A sweat sensing device comprising:

a continuous piece of hydrophilic paper comprising

a first region configured to receive sweat,

a second region opposite to the first region, and

a third region between the first region and the second region;

a flexible hydrophobic film having an opening,

wherein the flexible hydrophobic film and the continuous piece of hydrophilic paper are arranged adjacent to each other with the opening aligned to and exposing the second region, and are collectively folded in a stacked manner,

wherein in the stacked manner, the continuous piece of hydrophilic paper is adapted to diffuse the received sweat laterally along the continuous piece of hydrophilic paper from the first region to the second region via the third region; and

a sensor unit configured to facilitate a measurement based on the diffused sweat,

wherein in the stacked manner, the sensor unit is sandwiched between the third region and the second region.

2. The sweat sensing device as claimed in claim 1, wherein the continuous piece of hydrophilic paper comprises a continuous piece of cellulose paper.

3. The sweat sensing device as claimed in claim 1 or 2, wherein the continuous piece of hydrophilic paper has a thickness ranging from 0.01 mm to 0.2 mm, or preferably from 0.04 mm to 0.06 mm.

4. The sweat sensing device as claimed in any one of claims 1 to 3, wherein the continuous piece of hydrophilic paper has a porosity larger than 50%, or preferably larger than 60%, or more preferably larger than 70%.

5. The sweat sensing device as claimed in any one of claims 1 to 4, wherein the continuous piece of hydrophilic paper has an average pore size larger than 20 μm, or preferably larger than 40 μm.

6. The sweat sensing device as claimed in any one of claims 1 to 5, wherein the second region is adapted for the diffused sweat to passively evaporate via the opening.

7. The sweat sensing device as claimed in any one of claims 1 to 6, wherein the sensor unit comprises

a planar substrate; and

a plurality of planar electrodes disposed on the planar substrate.

8. The sweat sensing device as claimed in claim 7, wherein the sensor unit further comprises a plurality of conductors electrically coupled to the plurality of electrodes, the plurality of conductors being configured to provide external electrical connections.

9. The sweat sensing device as claimed in claim 8, wherein the plurality of conductors comprises silver, or copper, or gold, or other electrically conductive metals.

10. The sweat sensing device as claimed in any one of claims 7 to 9, wherein the planar substrate comprises a rigid substrate, or a flexible substrate, or a stretchable substrate.

11. The sweat sensing device as claimed in claim 10, wherein

the rigid substrate comprises polycarbonate or polymethylmethacrylate;

the flexible substrate comprises polyimide, polyamide, polyethylene terephthalate, polyethylene naphthalate, polypropylene, or polyetheretherketone;

the stretchable substrate comprises polydimethylsiloxane or styrene-ethylene-butylene-styrene.

12. The sweat sensing device as claimed in any one of claims 7 to 11, wherein the plurality of planar electrodes is a plurality of carbon electrodes.

13. The sweat sensing device as claimed in any one of claims 7 to 12, wherein the plurality of planar electrodes comprises multiplexed sensing electrodes.

14. The sweat sensing device as claimed in any one of claims 7 to 13, wherein in the stacked manner, the plurality of planar electrodes is arranged facing towards at least one of the second region or the third region.

15. The sweat sensing device as claimed in any one of claims 1 to 14, wherein the measurement comprises a colorimetric measurement, or an electrochemical measurement.

16. The sweat sensing device as claimed in any one of claims 1 to 15, wherein the measurement comprises an amperometric measurement, or a potentiometric measurement, or a resistive measurement, or an impedance measurement, or a transimpedance measurement.

17. The sweat sensing device as claimed in any one of claims 1 to 16, wherein the first region is extended laterally away from the third region along a same plane such that the stacked manner forms a U-bended shape with the first region providing a sweat collection portion arranged laterally adjacent to the third region providing a sensing layer, and the second region providing an evaporation layer.

18. The sweat sensing device as claimed in any one of claims 1 to 16, wherein the first region and the third region are folded over each other with corresponding parts of the flexible hydrophobic film facing each other such that the stacked manner forms a continuous zig-zag shape with the first region providing a sweat collection layer, the third region providing a sensing layer and the second region providing an evaporation layer.

19. The sweat sensing device as claimed in any one of claims 1 to 18, further comprising a further flexible hydrophobic film having an aperture, the further flexible

hydrophobic film and the continuous piece of hydrophilic paper being arranged adjacent to each other with the aperture aligned to and exposing the first region.

20. The sweat sensing device as claimed in claim 19, wherein each of the flexible hydrophobic film and the further flexible hydrophobic film comprises polyethylene, or polyethylene terephthalate, or polyester, or polythene, or polypropylene, or polyvinyl chloride.

21. The sweat sensing device as claimed in claim 19 or 20, wherein each of the flexible hydrophobic film and the further flexible hydrophobic film is provided with adhesive on one side for adhering to the continuous piece of hydrophilic paper.

22. The sweat sensing device as claimed in any one of claims 1 to 21, further comprising an external evaporation pad placeable over the opening to enhance passive evaporation of the diffused sweat.

23. The sweat sensing device as claimed in any one of claims 1 to 22, wherein each of the first region, the second region, and the third region is of a substantially same size.

24. The sweat sensing device as claimed in any one of claims 1 to 23, being a wearable sweat sensing device.

25. A method for forming a sweat sensing device, the method comprising:

providing a continuous piece of hydrophilic paper with a pre-determined shape of

a first region for receiving sweat,

a second region for evaporating the sweat,

a third region for sensing the sweat,

a first channel arranged between the first region and the third region, and

a second channel arranged between the second region and the third region,

wherein the first channel and the second channel are for the sweat to diffuse through to reach the respective regions;

providing a flexible hydrophobic film having an opening;

arranging the flexible hydrophobic film and the continuous piece of hydrophilic paper adjacent to each other with the opening aligned to and exposing the second region;

providing a sensor unit over the second region; and

collectively folding the continuous piece of hydrophilic paper and the flexible hydrophobic film into a stacked manner such that the sensor unit is sandwiched between the third region and the second region, wherein in the stacked manner, the sweat received by the first region is laterally diffused along the continuous piece of hydrophilic paper from the first region to the second region via the first channel, the third region and the second channel.

26. The method as claimed in claim 25, further comprising adhering the continuous piece of hydrophilic paper and the flexible hydrophobic film to each other.

27. The method as claimed in claim 25 or 26, further comprising folding the first region and the third region over each other, with corresponding parts of the flexible hydrophobic film facing each other, such that the stacked manner forms a continuous zig-zag shape with the first region providing a sweat collection layer, the third region providing a sensing layer and the second region providing an evaporation layer.

28. The method as claimed in any one of claims 25 to 27, further comprising providing a further flexible hydrophobic film having an aperture, the further flexible hydrophobic film and the continuous piece of hydrophilic paper being arranged adjacent to each other with the aperture aligned to and exposing the first region.

29. The method as claimed in claim 28, wherein prior to providing the further flexible hydrophobic film, the method further comprises cutting the aperture in the further flexible hydrophobic film.

30. The method as claimed in any one of claims 25 to 29, further comprising placing an external evaporation pad over the opening to enhance passive evaporation of the diffused sweat.

31. The method as claimed in any one of claims 25 to 30, wherein prior to providing the continuous piece of hydrophilic paper, the method further comprises cutting the continuous piece of hydrophilic paper into the pre-determined shape using a stencil marker.

32. The method as claimed in any one of claims 25 to 31, wherein prior to providing the flexible hydrophobic film, the method further comprises cutting the opening in the flexible hydrophobic film.