CLAIMS

1. A wearable sweat sensor for detecting one or more analytes in human sweat, comprising:

an optical module comprising at least one light source and at least one light detector attached to a support;

at least one sensor layer optically coupled to the optical module, the at least one sensor layer having optical absorbance properties that are dependent on the concentration of a target analyte of said one or more analytes; and

one or more processors in communication with the optical module and being configured to:

cause light from the at least one light source to be transmitted towards, and/or through, the at least one sensor layer;

obtain, from the at least one light detector, one or more optical signals reflected and/or transmitted from the at least one sensor layer; and

determine, from at least one wavelength component of the one or more optical signals, a target analyte concentration.

2. A wearable sweat sensor according to claim 1, wherein the optical module comprises a pulse oximeter.

3. A wearable sweat sensor according to claim 1 or claim 2, wherein the optical module comprises a plurality of light sources that emit light at different wavelengths.

4. A wearable sweat sensor according to any one of claims 1 to 3, wherein the one or more processors are further configured to determine, from the one or more optical signals, a heart rate and/or SpO_2 of the user, in addition to determining the target analyte concentration.

5. A wearable sweat sensor according to any one of claims 1 to 4, wherein the optical module comprises a plurality of light detectors configured to detect light at different wavelengths.

6. A wearable sweat sensor according to any one of claims 1 to 5, wherein the one or more processors are configured to determine the target analyte concentration of the user based on a ratio of two different wavelength components of the one or more optical signals.

7. A wearable sweat sensor according to any one of claims 1 to 6, wherein one of said analytes is hydrogen ions, and wherein at least one sensor layer comprises a pH-sensitive polymer layer.

8. A wearable sweat sensor according to claim 7, wherein the pH-sensitive polymer is polyaniline.

9. A wearable sweat sensor according to any one of claims 1 to 8, wherein one of said analytes is glucose, and wherein at least one sensor layer comprises a glucose-responsive hydrogel.

10. A wearable sweat sensor according to claim 9, wherein the hydrogel comprises poly-acrylamide, N,N'-methylenebisacrylamide polymerized with 3-(acylamido)phenylboronic acid.

11. A wearable sweat sensor according to claim 9 or claim 10, wherein the glucose-responsive hydrogel comprises gold nanoparticles.

12. A wearable sweat sensor according to any one of claims 1 to 11, wherein the at least one sensor layer comprises a polymer layer having aptamer-conjugated gold nanoparticles bound thereto, said aptamers being capable of binding specifically to the target analyte.

13. A wearable sweat sensor according to claim 12, wherein the target analyte is cortisol.

14. A wearable sweat sensor according to any one of claims 1 to 13, comprising a plurality of sensor layers each being configured to detect a different target analyte of said one or more analytes.

15. A wearable sweat sensor according to any one of claims 1 to 14, wherein at least one of said sensor layers comprises a plurality of regions each being configured to detect a different target analyte of said one or more analytes.

16. A wearable sweat sensor according to any one of claims 1 to 15, wherein the wavelength components comprise a red component and an infrared component.

17. A wearable sweat sensor according to any one of claims 1 to 16, wherein the at least one sensor layer comprises a plurality of regions each having different thickness and/or surface texture and/or levels of a dopant.

18. A wearable sweat sensor according to any one of claims 2 to 17, wherein the at least one sensor layer is attached to, or is integral with, the pulse oximeter.

19. A wearable sweat sensor according to claim 18, wherein at least one sensor layer forms a protective layer of the pulse oximeter.

20. A wearable sweat sensor according to any one of claims 1 to 19, comprising one or more of a band, clip, and adhesive layer for attachment of the support to the user.