Wearable Sweat Biosensing Device: Directional Transport of Sweat and Synchronous Detection of Multi-analyte

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Abstract

Sweat is an attractive biofluid for non-invasive diagnose due to its abundance of biochemical information. Wearable sweat biosensor holds promising potential in real-time monitoring the wearer's physiological state. However, the easy collection and directional transport of sweat sample and the synchronous detection of multi-analyte in sweat still remain challenges. Herein, we present a wearable sweat biosensing device composed of Janus membrane and multiplexed sensor array which can simultaneously detect diverse metabolites (such as glucose and lactate) and electrolytes (such as sodium and potassium ions) in sweat, as shown in Figure 1. The Janus porous membrane endows the device with fantastic sweat harvesting and directional transporting capability. The sweat generated on skin can be collected and drawn through the Janus membrane form the hydrophobic side to the hydrophilic side due to the wettablity gradient. The sensor array sandwiched between two porous layers continuously detects the analytes in sweat passing by, overcoming the defect that old sweat can mix with and contaminate new sweat. Skin temperature and pH of sweat are also monitored to calibrate the response of the sensors. This wearable device can make a real-time assessment of the physiological state of the human subjects during physical activities, and enable a wide range of personalized diagnostic and physiological monitoring applications.

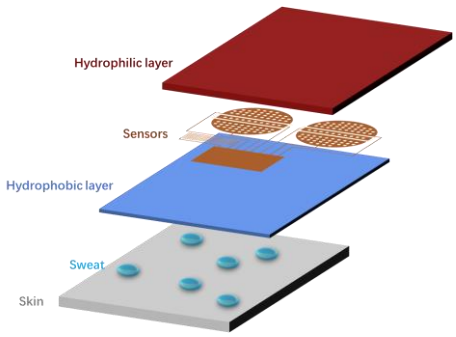

Figure 1: The structure of the wearbale sweat biosensing device

References

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