weat and interstitial fuid (ISF)

sources of information for monitor ing an individual's health. Wearable devices and assays that collect sweat and monitor biochemicals constitute a rapidly expanding multibillion-dollar market. However, collecting su ב s (NSF's) Engineering Research Centers (ERC). Their tech nique can achieve long-duration opera

method that requires no external power and works during passive sweating.

any physical exertion. The patch combines the action of three basic effects: osmotic microfuidic pump ing between skin and a hydrogel disk, capillary wicking through paper, and evaporation-assisted fuid management.

The osmotic extraction is based on a simple premise — the difference in the chemical potential created by the hydrogel gently pulls the biological fuid from the skin. The extracted sweat and biomarkers are wicked through the paper strip toward the evaporation pad. This sweat can be analyzed by a vari ety of sensing modalities (colorimetric, electrochemical, etc.). The evaporation of both the osmolyte and the sweat with biomarkers leads to accumulation of the non-volatile components of the sweat on the pad, and additionally cre

The patches can sustain continuous sweat sampling from hours to days. Testing shows that the patch is able to detect lactate and potassium ions. With help from electrical engineer Alper

that can sustain extended operation with inexpensive replaceable patches. The hydrogel-paper patches can also be used in simple noninvasive skin assays for affordable at-home test ing. The patent-pending technology is available for commercialization in new types of wearables.

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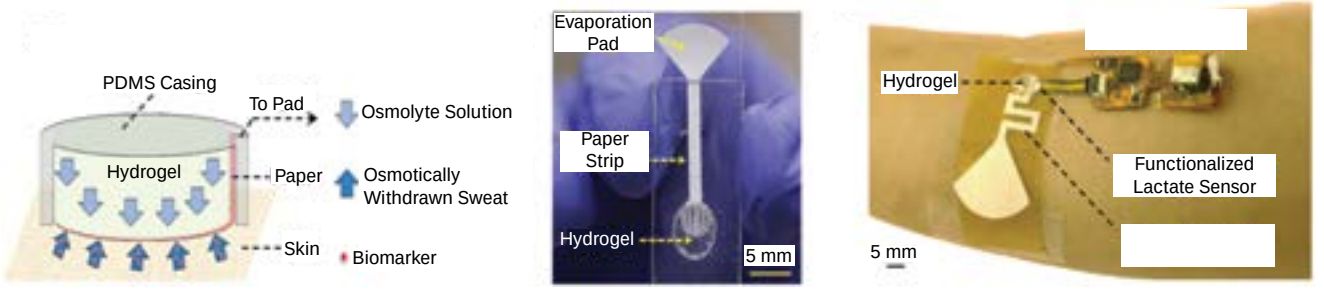

▲ (a) The hydrogel disc facilitates osmotic extraction of sweat. (b) Sweat is wicked along a paper strip and evaporation occurs at the terminal pad. (c) Sensors can be placed along the paper strip to detect bioanalytes that pass by during extraction. The integrated device for long-term lactate sensing includes a flexible wireless potentiostat mounted on the forearm using an adhesive patch.