Abstract

Disclosed is a skin-adherent, flexible patch for non-invasive continuous glucose monitoring in human sweat. The device integrates: (i) at least one interdigitated electrode (IDE) sensor whose finger geometry, conductive material (e.g., Au, Pt, graphene, MXene) and functional layer enable enzymatic, non-enzymatic or impedance-based glucose transduction; (ii) a sweat-handling interface—microfluidic channels or hydrogel—that wicks perspiration to the IDE while minimising evaporation; (iii) auxiliary temperature-, pH- and electrolyte-sensing elements that feed real-time calibration algorithms; (iv) an analog front-end, microcontroller and wireless transceiver powered by a thin-film battery or textile super-capacitor; and (v) firmware that compensates for environmental and physiological variability, performs drift correction and transmits glucose data to an external receiver for display, alerting and optional closed-loop drug delivery. The architecture achieves reliable detection of 0.02–0.6 mM glucose in sweat, yielding blood-equivalent trends without skin penetration. (Fig. 1)