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PROCEEDINGS

Antibacterial Surface Modification and Its Application on Janus Wearable Devices

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ABSTRACT

The prolonged health monitoring using wearable technology faces challenges stemming from perspiration, including bacterial proliferation, compromised adhesion, signal quality deterioration, and user discomfort. Notably, excessive sweat fosters bacterial colonization, escalating infection risks, and compromising biomarker analysis. Existing antibacterial approaches, unfortunately, risk disrupting the delicate balance of skin microbiota. To address this, we've developed a Janus patch featuring Zn-Al layered double hydroxide (LDH) modification, which boasts sustained antibacterial properties while preserving the epidermal microecology. It integrates a hydrophobic LDH fabric that mechanically eradicate bacteria via a nanoknife effect, and a laser-engraved medical adhesive with microholes for unidirectional sweat transport. This innovative design not only enhances adhesion stability but also safeguards the skin microbiome by preventing direct contact with Zn-Al LDH. Moreover, our patch seamlessly interfaces with sweat-monitoring technologies like uPADs sensors, ensuring 100% antibacterial efficacy and efficient sweat redirection for reliable detection while prioritizing user comfort. It could serve as a durable bridge between perspiring skin and epidermal sensors, revolutionizing the realm of long-term health monitoring.

KEYWORDS

Mechanically antibacterial, sweat-wicking, Janus patch, LDH

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