

Smart Medical Skin with Cephalopod-Inspired Miniaturized Suction Cups

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Skin-interfacing biomedical devices require robust and conformal adhesives onto curvilinear, and dynamically contorting skin to allow long-term use and high sensitivity. However, adhesion strength, biocompatibility, softness, and reusability still remain as momentous challenges. Bioinspired designs, represented by gecko and cephalopod, are considered as key factors for enhancing interfacial adhesion. Here, we present glue-free, multifunctional smart medical skin consisted of Cephalopod-inspired miniaturized suction cups (mSCs), vital sign sensors, and nanoparticle assisted therapeutics. Our system enables continuous monitoring of physiological signals such as pulse, blood pressure, electrocardiogram, respiration, and body/skin temperature. Also, cooperated smart band provides wireless communicated emergency alarm and iontophoretic drug delivery. Finally, because dry adhesive allows regeneration of patch, mSC is a cost-effective substitute for commercialized chemical adhesives. "Smart medical Skin", consisted of Cephalopod-inspired dry adhesive, highly sensitive epidermal sensors, and drug delivery, creates a truly wearable and reusable ubiquitous healthcare.