RESEARCH ARTICLE

Carbon Nanotube-Based Flexible Electronics for Wearable Health Monitoring Systems

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Abstract:

We report the development of carbon nanotube (CNT)-based flexible electronic sensors for continuous wearable health monitoring. Our multi-layer CNT architecture on a biocompatible polymer substrate enables simultaneous monitoring of heart rate, blood oxygen levels, body temperature, and sweat biomarkers with clinical-grade accuracy. The sensor array demonstrates exceptional mechanical flexibility (bending radius < 1mm), waterproofing (IP68), and long-term durability (> 6 months continuous operation). Clinical trials with 200 participants showed 99.2% correlation with standard medical devices. The manufacturing process is compatible with roll-to-roll printing, enabling potential mass production at less than $2 per unit.