

## Graphene-based Bioelectronics for Diabetes Monitoring and Therapy

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Due to outstanding electrical, mechanical, and optical properties, graphene synthesized by chemical vapor deposition has been useful material in micro- and macro-electronics. However, the low density of electrochemically active defects in the graphene limits its application in biosensing. Here, we introduce that the gold-doped graphene and combined with a gold mesh improves bare graphene's electrochemical activity sufficiently to form wearable sensors and actuators. The stretchable device features a serpentine-shaped bilayer of gold mesh and gold-doped graphene that form an efficient electrochemical interface for stable transfer of electrical signals. The glucose, pH, temperature, humidity, and strain sensor as well as drug-containing microneedles with embedded thermal actuators are integrated as a wearable type for sweat-based non-invasive blood glucose monitoring and transdermal drug delivery.