

An Intelligent Microengineered Electrocardiography Jacket for Long-term Monitoring of Heart Disease Patients

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Technology description

Heart diseases (mainly coronary heart disease) are the second leading killer disease category in Hong Kong since 1960s. About 12 persons per day died from the coronary heart disease in 2009. Thus, the long-term and efficient measurement of electrocardiography (ECG) for chronic heart disease patients is crucial and inevitable. With the financial support from the Innovation and Technology Commission, we have established an ECG jacket embedded with the measurement electronics. This ECG jacket, which appears to be regular clothes, can record the long-term heart status of patients for tele-health care and medical purposes.

From the user's perspective, this product has strict requirements on comfort, non-allergenicity and measurement reliability. In the past two decades, polydimethylsiloxane (PDMS) has emerged as a typical biocompatible structural material for biomedical microdevices. Indeed, applicability of PDMS can be extended to larger scale as an embedded material for the textile and clothing industries. PDMS can be modified to be electrically conductive by addition of specific nano-particles. This highly controllable yet easily achievable modification process enables PDMS to become an interface material between traditional textile products and highly integrated electronic circuits. This process potentially opens doors for industry of 'intelligent clothes' – the functional wearable product that senses the human body's characteristics.

Application area

On top of the ECG jacket itself, this technology can be applied to the measurement of electromyography (EMG), the signal from muscle contraction and relaxation.

This technology can be applied also in sport sciences.

Advantages

The micropatterning and conductivity modification of PDMS enable the development of the electronics embedded clothes (or widely referred to as 'intelligent clothes') for a wide range of applications. Our ECG jacket monitoring the continuous heart activity can indicate myocardial infarction of heart disease patients the soonest.

The impact of this product does not only for a technology breakthrough and industrial advancement, but also has its biomedical contribution, i.e. to save the heart disease patients' lives.

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