
Big Steps with New Chest Strap Monitor



Demand for ECG monitoring systems is increasing because hospitals and rehabilitation clinics are interested in using these instruments to monitor patients' hearts and circulatory systems as well as record and collect personal health data. However, the fact that gel electrodes are necessary for reliable long-term ECG measurements, it becomes a hurdle because they usually dry out within 24 hours and are unable to produce usable signals. In addition, gel electrodes are not very suitable for older patients because these patients are less mobile as compared to younger subjects and sweat less.

This hurdle may be overcome by using wettable electrodes. The idea was originally developed by a team at Empa Swiss Federal Laboratories for Materials Science and Technology which collaborated with industrial partners to develop cooling garments for multiple sclerosis patients. They developed flexing wetting elements that were filled with 30 mL of water. Instead of sewing the watertight membrane and the textile layer together, the scientists weld them to each other by using a special laser technique. The laser-welded seams were impervious to water and water vapour. The cooling effect was generated by the material that allowed minimal quantities of water to permeate through it.

The same technology has been applied to keep heart monitor electrodes moist all the time. The electrode pads are embroidered with a special fibre that is made of polyethylene terephthalate (PET). A thin plasma coating developed by the Empa's Advanced Fibers laboratory is applied. The coating has two layers: the inner layer of silver conducts the electrical signals and prevents the growth of microorganism and the outer layer of titanium ensures signal stability and prevents skin irritation.

The chest straps contain two of these specially embroidered sensor pads that are connected directly to a data logger. Signals are transmitted on to a central data collection unit. The data logger can be removed so that the chest strap can be washed. This was one of the stringent conditions before the electrodes could be authorised for use in long-term ECG monitoring.

The device has been tested but there is still some time before it will be available in the market.

Source: Empa Swiss Federal Laboratories for Materials Science and Technology

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