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Improved Embroidery Based Textile Electrodes for Sustainability of Impedance Measurement Characteristics

Authors : Bulcha Belay Etana

Abstract : Research shows that several challenges are to be resolved for textile sensors and wearable smart textiles systems to make it accurate and reproducible minimizing variability issues when tested. To achieve this, we developed stimulating embroidery electrode with three different filling textiles such as 3Dknit, microfiber, and nonwoven fabric, and tested with FTT for high recoverability on compression. Hence The impedance characteristics of wetted electrodes were caried out after 1hr of wetting under normal environmental conditions. The wetted 3D knit (W-3D knit), Wetted nonwoven (W-nonwoven), and wetted microfiber (W-microfiber) developed using Satin stitch performed better than a dry standard stitch or dry Satin stitch electrodes. Its performance was almost the same as that of the gel electrode (Ag/AgCl) as shown by the impedance result in figure 2 .The impedance characteristics of Dry and wetted 3D knit based Embroidered electrodes are better than that of the microfiber, and nonwoven filling textile. This is due to the fact that 3D knit fabric has high recoverability on compression to retain electrolyte gel than microfiber, and nonwoven. However,The non-woven fabric held the electrolyte for longer time without releasing it to the skin when needed, thus making its impedance characteristics poor as observed from the results. Whereas the dry Satin stitch performs better than the standard stitch based developed electrode. The inter electrode distance of all types of the electrode was 25mm, with the area of the electrode being 20mm by 20mm. Detail evaluation and further analysis is in progress for EMG monitoring application

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