



## **FLEXIBLE E-TEXTILE SENSORS FOR REAL-TIME HEALTH MONITORING AT MICROWAVE FREQUENCIES**

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*Abstract- This paper reports on testing of the performance of SmartLife® e-textile material. In particular, the response of the integrated conductive pathways at microwave frequencies in the region of 9 kHz to 6 GHz is investigated for both biomedical sensing and signal transmission purposes. The experimental results confirm the viability of exciting the e-textile material at ISM microwave frequencies at mW powers for the purposes of wearable non-invasive sensing. Custom made flexible microwave sensors suitable for integration into smart e-textile fabric were tested in their ability to perform real-time body parameters monitoring, in particular the level and composition of perspiration. Gradual change in both the resonant frequency peak and amplitude was recorded in the 2-3 GHz frequency range with increased volume of fluid (50-350  $\mu$ l) when in contact with a 5 $\times$ 8 mm<sup>2</sup> sensor. This fabric with built-in textile sensors could serve as a platform for "high-tech designer outfits" for an advanced healthcare approach where real-time data on patient condition is transmitted wirelessly for immediate processing and corrective action if*

*necessary. The novel sensor reported here was recently patented under milestone UK patent application number GB 2500000.*

**Index terms:** Flexible substrate, build-in textile sensor, personal health indicators, real-time monitoring, advanced healthcare approach.