Printing silver onto fibers could pave the way for flexible, wearable electronics

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A new technique for depositing silver onto clothing fibres could open up huge opportunities in wearable electronics.

Scientists at the National Physical Laboratory (NPL), the UK's National Measurement Institute, have developed a way to print silver directly onto fibres. This new technique could make integrating electronics into all types of clothing simple and practical. This has many potential applications in sports, health, medicine, consumer electronics and fashion.

Most current plans for wearable electronics require weaving conductive materials into fabrics, which offer limited flexibility and can only be achieved when integrated into the design of the clothing from the start. NPL's technique could allow lightweight circuits to be printed directly onto complete garments.

Silver coated fibres created using this technique are flexible and stretchable, meaning circuits can be easily printed onto many different types of fabric, including wool which is knitted in tight loops.

The technique involves chemically bonding a nano-silver layer onto individual fibres to a thickness of 20 nm. The conductive silver layer fully encapsulates fibres and has good adhesion and excellent conductivity.

Chris Hunt, Project Lead, says: "The technique has many potential applications. One particularly exciting area is wearable sensors and antennas which could be used for monitoring, for example checking on patients and vulnerable people; data capture and feedback for soldiers in the field; and performance monitoring in sports. It offers particular benefits over the 'weaving in' approach, as the conductive pattern and flexibility ensures that sensors are always positioned in the same location on the body."

The technique could also create opportunities in fashion and consumer technology, such as incorporating LED lighting into clothing or having touch-screens on shirt sleeves.

In addition, silver has antibacterial properties, opening up opportunities for medical applications such as wound dressings, face masks, long lasting anti-bacterial wipes, and military clothing.

Having successfully shown that the additive technique is viable in the lab, NPL is now looking for funding or collaborators to develop a full printed circuit on a textile, which can be tested for flexibility and robustness, for example by putting it through

the wash. Once this has been successfully achieved, the scientists will then look to develop prototypes of practical applications.

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