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Intellectual Property **UMIP®**

INKJET-PRINTED GRAPHENE E-TEXTILES

Smart fabrics incorporating wearable electronics

BACKGROUND

The explosive growth of the smart technology sector is driven by the consumer interest towards more interactive devices that can monitor and provide insights into various areas of our daily lives, such as health and fitness. Wearable electronics have a wide array of uses in the fields of biomedicine, sports, military and energy harvesting.

This University of Manchester (UoM) invention brings electronics to textiles, paving the way for the creation of ink-jet printed graphene containing smart fabrics that overcome many of the drawbacks that are traditionally encountered.

Knitting, weaving and embroidery of conductive threads, conductive metal coating and screen printing can be used to develop wearable electronic textiles but amongst these, inkjet printing of conductive materials onto textiles has gained manufacturers' interest due to its ease of use and manufacturing scalability.

There are currently many technical challenges and high costs associated with development of wearable electronic fabrics technology due mainly to the inherent rough and porous texture of fabrics.

A key technical difficulty concerns the ability to achieve a continuous conductive path on differing textile substrates. In addition to this current state of the art conductive inks are composed of costly metals, usually silver and thus often lack the flexibility required by the final garment. This can alter the feel of the fabric and result in the final garment being undesirable for its intended use.

THE TECHNOLOGY

Academics at the UoM have developed a method for ink-jet printing graphene containing inks onto textiles that circumvents the aforementioned drawbacks via the employment of a printed pretreated track. Prior to the application of the conductive ink the textile is treated with an environmentally friendly and breathable hydrophobic coating, comprised of a suitable polymer. This pre-treatment step creates a surface finish which is the key to reproducibly depositing the conductive ink tracks on rough, porous textiles. The technology has currently been demonstrated using both graphene and graphene/silver nanoparticle hybrid inks which can be deposited by ink-jet and has high conductivity (sheet resistance of 2.11 Ω/sq. on cotton).

KEY BENEFITS

The hydrophobic coating achieves a surface finish which allows the direct printing of a graphene based conductive track on a range of different textiles.

APPLICATIONS

- Biomedical monitoring - ECG
- Smart sportswear – monitoring heart rate and muscle activity
- Fashion industry – LED dress
- E-Textiles Eye-tracker - addressing mental health issues such as sleep pattern
- Military applications
- Apparel RFID

INTELLECTUAL PROPERTY

A patent application has been filed to protect this technology.

OPPORTUNITY

The technology presents an excellent licensing and development opportunity for companies with an interest in e-textiles.

UMIP REFERENCE

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UMIP
Core Technology Facility, 46 Grafton Street, Manchester M13 9NT, United Kingdom
T: +44 (0)161 603 7600 / F: +44 (0)161 606 7307 / E: graphene@umip.com / www.umip.com