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Wearable electronics based on graphene-coated conductive textile fibers

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The concept of smart-textiles is witnessing a rapid development with recent advances in nanotechnology and materials engineering. Bearing in mind that the concept of textiles is much wider than clothes and garments, the potential is immense. While most current commercial applications rely on conventional hardware simply mounted onto fibers or fabrics, a new approach to e-textiles consisting in using functionalized textiles for several technological applications has the potential to change the paradigm of wearable electronics completely. Conducting fibers are an important component of any e-textile, not only because they can be used as wiring for simple textile-based electronic component, but also because they can be used to build electronic devices directly on textile fibers. We have reported a new method to coat insulating textile fibers with monolayer graphene to make them conductive while preserving their appearance. There are a number of factors that can greatly influence the sheet resistance achieved by graphene-coated textile fibers. In order to understand the influence of the topography of the fibers on the effectiveness of the graphene coating, an extensive study encompassing microscopy techniques like Atomic Force Microscopy and Scanning Thermal Microscopy, as well as Raman spectroscopy was performed. This method has proven to be a versatile tool to achieve flexible, transparent and conducting fibers of different materials, sizes and shapes. The first applications of electronic devices built on such fibers are demonstrated with an alternating current electroluminescent device, following previous work in our group on similar devices in flexible substrates. This opens up the way for the realization of wearable devices on textiles.

Biography

Elias Torres Alonso has a background in Physics with a specialization in Physics of Materials in the Complutense University in Madrid. After that, he obtained an Erasmus fellowship to spend one year in Lund University in Sweden, where he worked with III-V Nanowires. At the moment, Elias is working towards his PhD in Physics/Engineering at the University of Exeter, United Kingdom, where he uses various 2D materials to create flexible, wearable and scalable next-generation electronic and optoelectronic devices within the group of Prof Monica Craciun and Prof Saverio Russo.

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