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Fiber networks modified with graphene for durable and versatile flexible electronics

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Flexible and foldable electronic components require materials that can retain their electrical conductivity even after hard mechanical manipulations and multiple folding events. Such a material was realized with two different methods exploiting the combination of all-biodegradable components (substrate and the polymer matrix) and graphene nanoplatelets (GnPs). A fibrous cellulose substrate was sized with a biopolymer-GnPs conductive ink rendering it electrically conductive (sheet resistance ≈10 Ω/sq). The obtained nanocomposite can be used as electrodes for surface electromyography and for terahertz electromagnetic interference shielding. With a similar approach a flexible cotton-GnPs conductive fabric was realized. This material address several drawbacks related to durability and washability of conductive textiles. Micro-cracks formed after repeated folding-unfolding events can be healed through a hot pressing process. Such cotton based conductive composites could find several applications in wearable electronics sector.

Biography

Pietro Cataldi is working on the creation of nanocomposites combining plastics and biopolymers with graphene to obtain unconventional multifunctional material. He has completed his Master of Science in Physics in the year 2014. He studied at the University of Genova and at the Berlin Freie University. He has done his Master's thesis in the Electron Dynamics Group of the Physical Chemistry department at the Fritz Haber Institute of the Max Planck Society. Currently, he is pursuing his PhD in the Smart Materials Group of the Italian Institute of Technology of Genova. He co-authored 5 papers and has participated in four international conferences with an oral contribution.

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