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Fiber network modified with graphene for foldable and wearable 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 nanocomposites can be used as electrodes for surface electromyography and for terahertz electromagnetic interference shielding. With a similar approach, a flexible cotton-GnPs conductive nanocomposite was realized. This material addresses several drawbacks related to durability and washability of wearable electronics material. 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 smart textile industry.

References

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Biography

Pietro Cataldi has completed his masters in physics from Genova University. He is currently pursuing PhD in Smart Materials group at the Italian Institute of Technology. He has published 5 papers in reputed journals. He has a patent request pending.

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