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Flexible Laser Reduced Graphene Oxide/MnO2 Electrode for Supercapacitor Applications

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Abstract : We succeeded to produce a high performance and flexible graphene/Manganese dioxide (G/MnO2) electrode coated on flexible polyethylene terephthalate (PET) substrate. The graphene film is initially synthesized by drop-casting the graphene oxide (GO) solution on the PET substrate, followed by simultaneous reduction and patterning of the dried film using carbon dioxide (CO2) laser beam with power of 1.8 W. Potentiostatic Anodic Deposition method was used to deposit thin film of MnO2 with different loading mass 10 – 50 and 100 µg.cm-2 on the pre-prepared graphene film. The electrodes were fully characterized in terms of structure, morphology, and electrochemical performance. A maximum specific capacitance of 973 F.g-1 was attributed when depositing 50 µg.cm-2 MnO2 on the laser reduced graphene oxide rGO (or G/50MnO2) and over 92% of its initial capacitance was retained after 1000 cycles. The good electrochemical performance and long-term cycling stability make our proposed approach a promising candidate in the supercapacitor applications.

Keywords : electrode deposition, flexible, graphene oxide, graphene, high power CO2 Laser, MnO2
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