

The preparation of graphene ink from the exfoliation of graphite in pullulan, chitosan and alginate for strain-sensitive paper

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ABSTRACT

A sonication of graphite in polysaccharide (pullulan, chitosan and alginate) is one of the viable methods for the preparation of few-layer graphene. However, the effect of these adsorbed polysaccharides on the electrical performance of the produced graphene so far is not yet clear. In order to investigate the present effect of pullulan, chitosan and alginate on the electrical characteristic of resulted graphene, we have produced few-layer graphene using bath sonication of graphite in pullulan, chitosan and alginate medium for the application as electrical conductive ink in strain-sensitive. Data from the TEM reveals the appearance of folded few-layer graphene flakes after sonication for 150 min while the XPS data shows that the chitosan-based graphene possesses the highest carbon-oxygen ratio of 7.2 as compared to that of the pullulan and alginate-based graphene. By subjecting the produced graphene as the ink for paper-based strain sensor, we have discovered that the chitosan-graphene has the best resistivity value ($1.66 \times 10^{-3} \Omega \cdot \text{cm}$) and demonstrate the highest sensitivity towards strain (GF: 18.6). This result interestingly implies the potential of the reported chitosan-based conductive ink as a strain-sensitive material for future food packaging.

KEYWORDS

Graphene; Sonication; Pullulan; Alginate; Chitosan; Strain-sensitive

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