

Facile synthesis of titanium nitride/graphene hybrid nanostructure for high performance supercapacitor and sensor applications

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Titanium nitride (TiN) nanoparticles decorated graphene composite is fabricated by a two-step process. The TiN nanoparticles with an average particles size of less than 20 nm are homogeneously coated on the graphene surface. The composite exhibits a high specific capacitance and good rate capability. The may be attributed to the large surface area of the electrode. The electrochemical performance of the proposed sensor is investigated using cyclic voltammetry and chronoamperometry. The amperometric study shows a linear relationship to the dopamine concentration, with a regression equation of: I (μA) = 0.9642 C (μM) + 1.0723 ($R^2 = 0.9983$). The sensor exhibits a high sensitivity, a rapid response time and a low detection of limit. The proposed electrode shows good reproducibility and long-term stability. The sensor is used to determine the dopamine in human serum samples with acceptable recovery, implying its feasibility for practical application.