A Green One-step Approach for the Synthesis of Graphene Included Bismuth Oxychloride Nanosheets and Photoelectrochemical Sensing

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We have utilized a simple and green approach for the preparation of graphene included bismuth oxychloride nanosheets (BiOCl(G)-NS). The approach involves the hydrothermal method, eco-friendly chemicals and short reaction time. The as prepared BiOCl(G)-NSs were characterized by field emission scanning electron microscopy, energy dispersive electron X-ray spectroscopy, Fourier transform infrared sprctroscopy, X-ray diffraction studies, electrochemical impedance spectroscopy and cyclic voltammetry. The photoelectrochemical properties of BiOCl(G)-NS were evaluated in a redox electrolyte and also in the presence of glucose and compared with BiOCl-NS by cyclic voltammetry and amperometry under light irradiation. Results from cyclic voltammetric and deferential pulse voltammetric measurements revealed that the BiOCl(G)-NS electrode is capable of generating photocurrent for glucose when its surface is irradiated with visible light. The inclusion of G in BiOCl-NS increases the photocurrent responses to glucose. The photocurrents produced for the oxidation of glucose through photoamperometry at +0.50 V were linearly correlated to the glucose concentration in the range of 0.5 to 10 mM with a detection limit of 0.22 mM. The BiOCl(G)-NS based non-enzymatic glucose sensor exhibited good performances with high sensitivity (1.878 and 127.2 μM mM^{-1} cm^{-2}), wide concentration range (500 μM – 10 mM), good selectivity, reproducibility (RSD=2.4%) and applicability to real sample (human serum).