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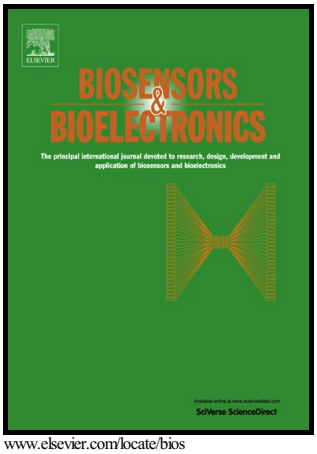

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ABSTRACT

Early diagnosis of cancers is critical for prevention of metastasis and early treatment. The study reports an electrochemical sensor for detection of cancer cell based on folic acid (FA) and octadecylamine (OA)-functionalized graphene aerogel microspheres (FA-GAM-OA). Citric acid was mixed with FA and OA and heated at 180°C for 4 h to form FA and OA-functionalized graphene oxide. The graphene oxide was employed as solid particle surfactant for stabilizing toluene-in-water emulsion. The graphene oxide sheets in the emulsion were self-assembled into graphene oxide gel microspheres on the water/toluene interfaces. Followed by free drying and reduction in H_2 at 400°C for 5 h. The resulted FA-GAM-OA shows a sphere-like structure with an average diameter of 1.2 μm, the rich of open-pores and folic acid groups. Small particle size and good hydrophilicity make FA-GAM-OA can be dispersed in water for sensor preparation. The small size of graphene sheets and their self-assembly avoid a serious agglomeration of graphene sheets. The FA-GAM-OA offers a large surface area (1723.6 m^2 g^{-1}) and high electronic conductivity (2978.2 S m^{-1}). The covalent linkage and ordered alignment of folic acid groups at FA-GAM-OA surface achieve to specific cancer cell capture with high capture efficiency. The electrochemical sensor based on FA-GAM-OA exhibits extremely good analytical performances in detection of liver cancer cells with a linear range of 5 to 10^5 cell mL^{-1} giving a low detection limit of 5 cells mL^{-1} (S/N=3). The method was successfully applied to electrochemical detection of liver cancer cells in whole blood.