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A new calcium germanate-graphene nanocomposite modified electrode as efficient electrochemical sensor for determination of daphnetin

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Abstract

A novel electrochemical daphnetin sensor was developed by employing a nanocomposite of calcium germanate-graphene (Ca_2GeO_4-GR) as an effective electrode material. In this strategy, Ca_2GeO_4 nanowires could be uniformly distributed on the GR surface with average diameter of about 30-60 nm as exhibited by transmission electron microscopy (TEM). The fabricated sensor (Ca_2GeO_4-GR/GCE) exhibited excellent current response towards daphnetin with linear range of 2.0×10^{-8} mol L^{-1} to 9.0×10^{-7} mol L^{-1} and detection limit of 6×10^{-9} mol L^{-1} (S/N=3). In addition, the sensor also demonstrated strong anti-interference properties in the presence of some metal ions and organic compounds. The proposed method was successfully applied for determination of daphnetin in traditional Chinese medicine (Zushima) and Zushima tablets with satisfactory results.

Key words: Daphnetin; Ca_2GeO_4; Graphene; Electrochemical sensor;