A Novel Detection Sensor for prohibited colorants in Food by Graphene/Silver Nanocomposite

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The use of synthetic colorants in foods is strictly controlled by legislation in many countries for them pose a potential risk to human health, especially if they are excessively consumed. A large number of analytical methods have been proposed for the identification and determination of various food colorants. However, most of them require a step of pretreatment and time-consuming cannot be applied to complex colorant mixtures. In this work, a novel nano-sensor to detect prohibited colorants in food has been developed measured by surface-enhanced Raman spectroscopy (SERS), which was made up of graphene and silver nanocomposite. Graphene is a zero-bandgap semiconductor owing to its two-dimensional (2D) platelike structure composed of sp²-bonded carbon atoms, which was a good candidate as an adsorbent for some benzenoid form compounds by large delocalized electron system. The nanocomposite exhibited potential application for prohibited colorants combining the excellent Raman effect of Ag nanoparticle and the wonderful enrichment effect of graphene for colorant molecules. Quantitative detection of each prohibited colorant was carried out by SERS measurement on this novel substrate with different concentrations, and the limit of detection can reach 0.1 μM. In addition, qualitative analysis of a mixture of four colorants has been investigated by distinguishing their characteristic peaks. The proposed method possesses the significant advantages of simplicity and rapidness for the sensitive analysis of prohibited additive colorants in food.