

Research progress in the detection of common foodborne hazardous substances based on functional nucleic acid biosensors

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Abstract

With the further improvement of food safety requirements, the development of fast, high sensitivity, and portability methods for the determination of foodborne hazardous substances has become a new trend in the food industry. In recent years, biosensors and platforms based on functional nucleic acids and a range of signal amplification devices and methods have been established to allow rapid and sensitive determination of specific substances in samples by different methods, opening up a new avenue of analysis and detection. In this paper, functional nucleic acid types including aptamers, deoxyribozymes and G-quadruplexes which are commonly used in the detection of food source pollutants are mainly introduced, as well as nano signal amplification elements including quantum dots, noble metal nanoparticles, magnetic nanoparticles, DNA walkers, DNA logic gates. signal amplification technologies including nucleic acid isothermal amplification, HCR, CHA, biological barcode, and microfluidic system are combined with functional nucleic acid sensors and applied to the detection of many foodborne hazardous substances, such as foodborne pathogens, mycotoxins, residual antibiotics, residual pesticides, industrial pollutants, heavy metals, and allergens. Finally, the potential opportunities and broad prospects of functional nucleic acid biosensors in the field of food analysis are discussed.

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