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Functionalization techniques for improving SERS substrates and their applications in food safety evaluation: A review of recent research trends

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Abstract

Background: Food safety and quality have gained much attention in recent years and the capability to evaluate food quality and safety in a sensitive, rapid, and reliable manner is of great importance in the food industry. Therefore, surface-enhanced Raman scattering (SERS) with the advantages of excellent sensitivity, fingerprinting ability and significant enhancement to identify the target has demonstrated a great potential for quick detection of chemical contaminants, chemical constitutes, and pathogens in food samples.

Scope and approach: The enhancement of Raman signals for SERS is not only related to the interactions between substrates and samples but also the functionalization of substrates to gain SERS active substrates. In the present review, different types of substrates are briefly discussed, functionalization techniques for SERS active substrates are discussed, and applications of functionalized SERS substrate in food samples are presented.

Conclusions and key findings: It is evident that functionalization techniques for improving SERS substrates have given encouraging outcomes, which provides possibility for identifying multiple target analytes within a multifaceted matrix, and thus could be used for decreasing the occurrence of food safety problems as well as for enhancing food quality surveillance.