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Preparation of cellophane-based substrate and its SERS performance on the detection of CV and acetamiprid

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Abstract: Cellophane was taken as platform to fabricate a new SERS substrate via silver mirror action. From Raman spectra, it can be found that the Raman signal of Ag-coated cellophane has little influence on the detection of analytes molecules. Raman mapping analysis showed that the cellophane-based SERS substrate has good uniformity. By using the Ag-coated cellophane, 10^{-6}~10^{-9} M crystal violet (CV) could be detected by this substrate and the reproducibility of the substrate was also involved. Acetamiprid was also detected via Ag-coated cellophane. The result showed that cellophane is suitable to be taken as platform for preparation of SERS substrates.

Keywords: cellophane, silver nanoparticles, SERS, crystal violet, acetamiprid

1. Introduction

Recently, a range of analytical techniques combined with several types of sensor platforms have being used to detect chemical and biological hazardous molecules [1]. Surface-enhanced Raman spectroscopy (SERS) is a promising technique for the trace detection and analysis of hazards because of its good sensitivity and spectral selectivity [2-4]. Nowadays, SERS technique has made great progress in fields such as food safety [5, 6], explosives [7] and environment monitoring [8, 9].

The fabrication of the SERS substrate is one of the key processes for SERS analysis [10]. As well known, cellulosic matrices can be taken as an effective platform due to their abundance in nature, can be taken as an effective platform has been highlighted due to their abundance in nature, and being a biodegradable and biocompatible polymer [11].

Recently, many kinds of cellulosic matrices such as filter paper [12-17], sulfate