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DETECTION AND IDENTIFICATION OF MEDICALLY IMPORTANT ALKALOIDS USING THE SURFACE-ENHANCED RAMAN SCATTERING SPECTROSCOPY

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ABSTRACT

Currently, trace detection of drugs, medicinal products, psychoactive substances, poisons and other natural or synthetic compounds in the human body has become one of the most important areas of interest in medicine, toxicology and forensic research. Due to the rapid development of nanotechnology, applications in forensic and biological sciences, food industry and art preservation there is an increasing interest in surface-enhanced Raman scattering (SERS) spectroscopy as a technique capable of low detection limits in the analysis of small amounts of studied analytes.

In this study, different excitation wavelengths (785 nm and 1064 nm) were used to find the appropriate experimental conditions for the detection and identification of medically significant alkaloids – atropine and pergolide – by means of surface-enhanced Raman scattering spectroscopy. SERS spectra of selected alkaloids were measured in the concentration range $10^{-3} - 10^{-9} \text{ mol}\cdot\text{L}^{-1}$ using large-scaled platinum substrates coated with electrochemically prepared gold or silver SERS-active layers. Identification was based on the assignment of surface-enhanced characteristic vibrational bands using theoretical (DFT) calculations and comparing them with normal (non-enhanced) Raman spectra of pure compounds. All sets of spectral data

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