Solid SERS substrates optimized for quantitative analysis applied to anticancer drugs in biofluids.

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In the latest years, the use of Surface-Enhanced Raman Spectroscopy with solid substrates for nanoplasmonic sensing has been considerably growing [1]. The signal enhancement due to nanostructured materials such as gold and silver nanoparticles, coupled with the specificity of Raman spectroscopy, makes SERS highly sensitive to the presence of specific molecules in low concentration [2]. The idea of combining efficiency and rapidity of SERS measurements with the availability of portable instruments, could be extremely attractive for applications where a quick response is needed on the spot. Monitoring of anticancer drugs in biofluids of patients undergoing chemotherapy is one of these. So far, therapeutic drug monitoring has been performed with sophisticated techniques such as HPLC/MS (High Performance Liquid Chromatography/Mass Spectrometry), for which the high sensitivity and specificity comes at the cost of time consuming and expensive analysis.
We present a potential point of care method to monitor in real time plasmatic concentration of antitumor agents. The method employs paper-made solid SERS substrates obtained upon immobilizing gold or silver nanoparticles on common filter paper [3]. The substrates were found to be repeatable and homogeneous, allowing quantitative analysis. Moreover they were sensitive to anticancer drugs both in a model phosphate buffered saline (PBS) solution and in human plasma [4].
Such solid substrates could allow SERS detection of anticancer drugs in a complex matrix, leading to a platform for a point of care tool development which is low cost, reproducible and faster than the currently used techniques.

References

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