Towards reusable SERS arrays in analytical applications

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Regular patterned metallized microstructured surfaces are of high interest in advanced optical sensing applications. The strong electromagnetic field enhancement due to the excitation of localized and propagating surface plasmon polaritons is used for the effective enhancement of the inherent weak Raman signals which is known as surface enhanced Raman spectroscopy (SERS). Thus, fingerprint specificity will be combined with trace-level sensitivity makes SERS an attractive and powerful tool for analytical and bioanalytical applications [1].
However, the application of SERS for ultrasensitive analysis is often hampered due to the lack of reproducibility across a large measuring area when using conventional SERS substrates (such as roughened metal electrodes or aggregated metal nanoparticles). In previous work, we have established the electron-beam lithography (EBL) for fabrication of regular ordered gold nanostructures in order to achieve a reproducible signal enhancement [2-4].
Within this contribution a fabrication technique using a silver metal deposition on a pre-structured substrate is shown [5]. This allows on the one hand different preparation and material parameters and on the other hand the reuse of the substrates for SERS applications. Here, the EBL process can be applied more cost-efficient for fabrication of SERS substrates. The characterization by means of various optical and imaging techniques and the application towards an analytical detection scheme is introduced.

References

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