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Solid Plasmonic Substrates for Breast Cancer Detection by Means of SERS Analysis of Blood Plasma

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Abstract: Surface enhanced Raman spectroscopy (SERS) represents a promising technique in providing specific molecular information that could have a major impact in biomedical applications, such as early cancer detection. SERS requires the presence of a suitable plasmonic substrate that can generate enhanced and reproducible diagnostic relevant spectra. In this paper, we propose a new approach for the synthesis of such a substrate, by using concentrated silver nanoparticles purified using the Tangential Flow Filtration method. The capacity of our substrates to generate reproducible and enhanced Raman signals, in a manner that can allow cancer detection by means of Multivariate Analysis (MVA) of Surface Enhanced Raman (SER) spectra, has been tested on blood plasma samples collected from 35 healthy donors and 29 breast cancer patients. All the spectra were analyzed