Surface Enhanced Raman Scattering, from labeling toward an analytical technique

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Surface Enhanced Raman Scattering arises when an exciting electromagnetic field with localized plasmons resonates of nanostructured surfaces. Molecular species experience enhanced local fields on the surfaces and the Raman scattering is amplified. Aggregated Gold nanoparticles,[1] as well Gold as nanostars, [2] are examples of some of the best candidates as colloidal SERS substrates. Labeling [3] or contrast agents [4], both in vitro or in vivo, have shown to be efficient when based on such substrates. The evolution SERS toward of а reliable quantitative technique is now attracting attention, due to the information present in the vibrational spectrum and the possibility to run measurements in aqueous samples. experience From previous on unfunctionalized substrates, [5] a novel strategy for a quantitative assay based on a competitive approach was developed.[6] magnetic/plasmonic FeO_x/Au Janus nanostars (JNS) are here presented as successful colloidal SERS substrates for quantification of several analytes within the nano-micromolar range. Their magnetic behaviour was found useful for remotecontrolled sample concentration within a microfluidic device, while their superior SERS activity was used for the quantification.

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Figure 1: a) representation of the 3D printed microfluidic device in which the JNS interact with the analyte and concentrate at the magnet before the Raman measure; b) Boundary Element Method based simulations show high local field enhancements at the star tips; c) calibration curves of several analytes can be obtained within the nano-micromolar range.