SERS in a broad range of analytical applications - membranes

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In an effort to establish surface enhanced Raman scattering (SERS) as an extremely simple and practical analytical method for a broad range of analytical applications, we apply this technique in membrane technology. In the waste water treatment, it is anticipated to overcome the immanent limitation of counterbalance between flux and selectivity by the infiltration of CNTs into a porous polymeric membrane. A basic principle of the CNT incorporated membranes is the efficient binding of CNTs in the membranes to minimize probable health risk associated with chances of product water getting contaminated with CNTs. SERS was very recently used for the quantification of MWCNTs in water suspensions at quite low concentration range, after being released from CNT-embedded membranes [1]. The functionalization of the MWCNTs with pyridine groups seems to favor the surface enhancement of the relevant Raman signal and this study constituted the first step of a work in progress for the characterization of CNTs by SERS in any water suspension.

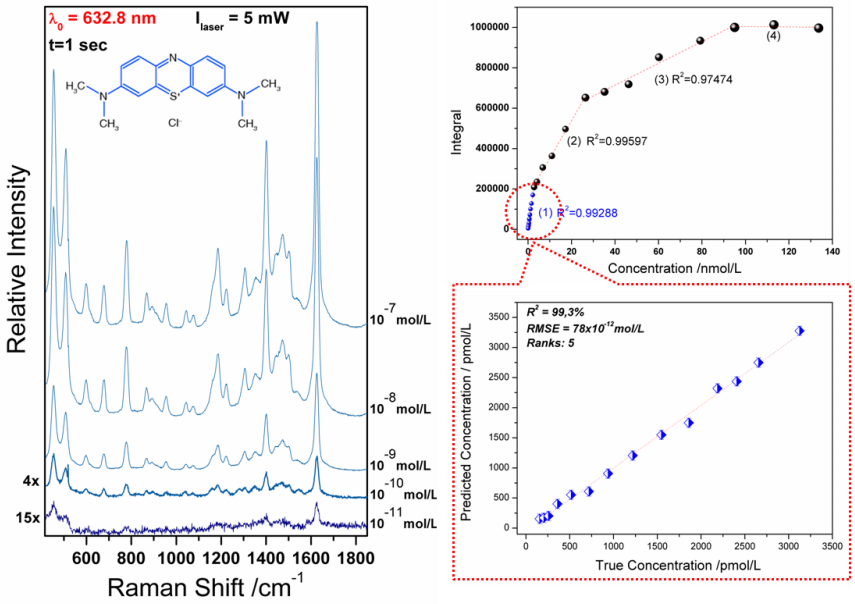

Figure 1: Representative SERS spectra of Methylene Blue in Ag nano-colloids (Right). Calibration curve in a large concentration range (Left-top). Predicted versus known concentrations at very low concentration range (Left-bottom).

Moreover, given that extremely small amounts of foulants can be detected and further quantified via SERS in large volume samples, SERS was applied in the investigation of waste water effluents. More precisely, we present SERS measurements of aqueous solutions containing pg levels of methylene blue, a heterocyclic aromatic dye used in the textile industry that causes severe central nervous system toxicity at plasma concentrations over 1.33 mol/L.

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References

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