Novel strategies based on Surface-enhanced Raman Spectroscopy (SERS) for gas phase detection of neurotoxic agents at sub-ppm level

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Neurotoxic agents are most potent in the vapor form as they can readily access our respiratory system to cause harm in a few minutes even at ppm level. Therefore, timely detection of neurotoxic agents in gas phase is crucial for the public safety and for First responders (FRs) who have to rapidly identify, detect and analyze threats and hazards.

Nowadays, sensors based on Surface-enhanced Raman spectroscopy (SERS) are gaining importance for gas detection and identification[1–3]. SERS effect is produced by electromagnetic enhancement caused by the surface plasmon generated on the metal surface under the excitation of light. SERS solves the three important requirements for gas sensing: selectivity, sensitivity and on-field detection. SERS, as vibrational spectroscopy, offers molecular-specific information even at trace level. In addition, molecules confined within the enhanced electromagnetic fields "hot spots" suffer a large increase in its cross-section what produces an increase of its Raman intensity reducing the limit of detection of the molecule. These features become SERS sensors in a powerful "plasmonic nose", capable of mimic human's nose.

The aim of this seminar is summarize different plasmonic platforms developed in our lab for gas phase detection of neurotoxic agents at sub-ppm level. I will discuss the fabrication and characterization of the SERS substrates in terms of selectivity, sensibility, reusability and on-field detection.

References

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