

A new system which allows the detection of cocaine at very low concentration levels has been developed

It has been devised by researchers at the UPV, CIC biomaGUNE and the CIBER Bioengineering Biomaterials and Nanomedicine (CIBER-BBN)

The system has also been assessed for the detection of Mycoplasma. The main novelty lies in the combined use of silica nanoparticles and SERS spectroscopy

(Donostia-San Sebastián, 28 September 2016). Researchers from the Universitat Politècnica de València, CIC biomaGUNE and CIBER Bioengineering Biomaterials and Nanomedicine (CIBER-BBN) under the Carlos III Health Institute, have devised a new method to detect cocaine and Mycoplasma in very low concentration levels. An alternative design for its use in laboratories which is potentially more competitive than other analysis methods currently used.

The main novelty of this method lies in the combined use of mesoporous silica nanoparticles, equipped with molecular gates and SERS spectroscopy (Surface-Enhanced Raman Scattering), a signal amplification system that uses gold nanoparticles to detect very low concentrations of the substances under test. According to the tests developed in the laboratory, in the case of cocaine, it has allowed them to reach nanomolar detection levels and 30 copies of genomic DNA/ μL at Mycoplasma levels.

The detection system is based on the release of a dye which is easily identifiable by SERS spectroscopy from inside silica nanoparticles, only when the species to be detected is present. "The pores of the nanoparticles unblock in the presence of Mycoplasma or cocaine and a dye that interacts with gold nanotriangles is released, hence this interaction is detected by SERS spectroscopy. The concentration of the substance to be detected is proportional to the signal detected", explains Ramón Martínez Máñez, director of the Inter-university Research Institute for Molecular Recognition and Technological Development and Scientific Director of CIBER-BBN.

"Never before SERS spectroscopy had been combined with mesoporous silica materials equipped with molecular gates to carry out these tests. The results obtained in this investigation have been very positive and leave the door open so that this method can be



used in the detection of other pathogens" added Luis M. Liz-Marzán, Ikerbasque Professor at CIC biomaGUNE.

The work developed by the Valencian and Basque researchers has been published in the Chemistry-A European Journal.

References:

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