

Nanoplasmonics and Surface Enhanced Spectroscopy

Vibrational spectra of pyridostigmine bromide

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Recently it was demonstrated that Surface Enhanced Raman Scattering (SERS) and Surface Enhanced Infrared Absorption (SEIRA) are prospective for the detection of hazardous admixtures such as melamine in the raw milk, traces of explosive materials in liquids and gases.

Since the work with hazardous compounds is complicated and requires an additional accident control measures we used in our work pyridostigmine bromide as non-dangerous analog of military chemical agent named sarin. The analogy between these analytes is in the mechanism of their activity. Both of them work as an inhibitors of cholinesterase. Pyridostigmine bromide works as an antidote, which brakes chemical bonding of sarin and cholinesterase and substitutes sarin in the synaptic cleft.

Here the Raman and infrared spectra of pyridostigmine bromide are measured. Spectral bands are assigned with certain types of molecular vibrations. Possibilities for surface enhanced Raman scattering are tested on the two types of nanoparticles: gilded spheres and triangular prismatic microcrystals. It was revealed that spherical nanoparticles are more Raman active and give up to 60-100 times enhancement in the amplitude of Raman bands characteristic for the pyridostigmine bromide.

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