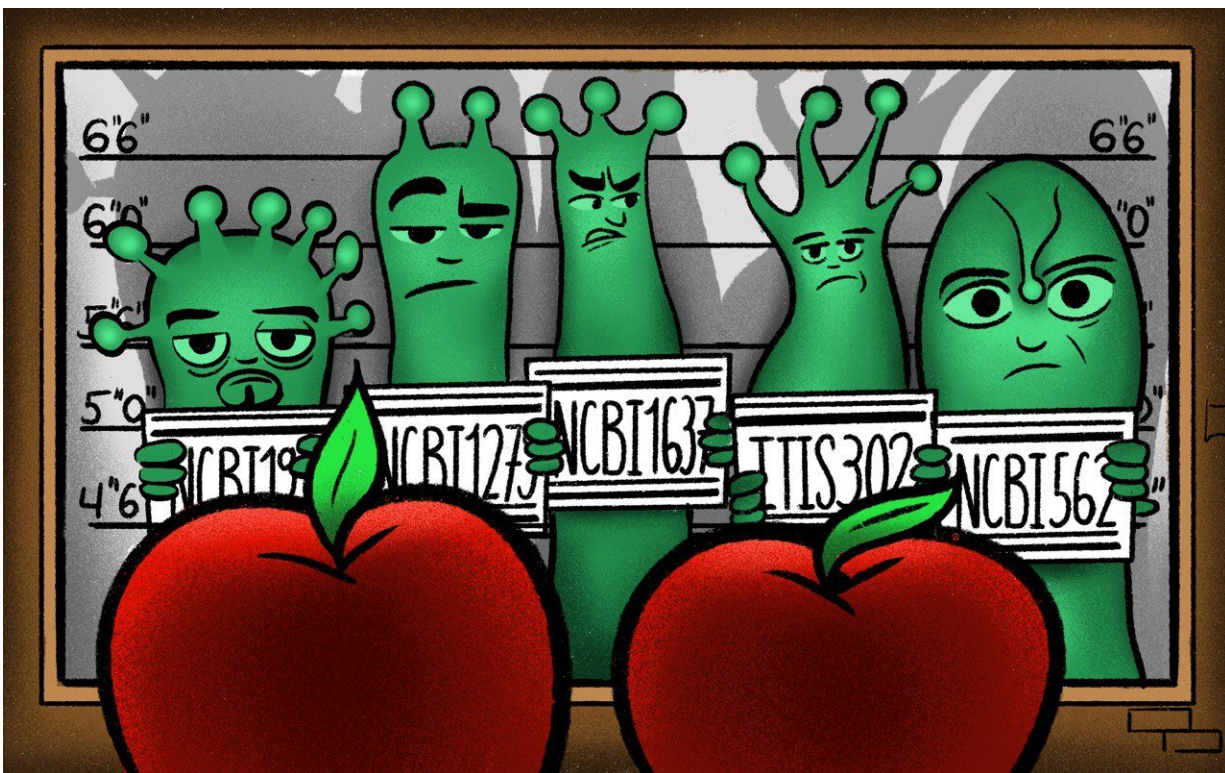


Technology to detect chemicals in fruit and vegetables

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Credit: Dmitry Lisovsky

An ITMO Ph.D. student with her colleagues from Russia, Spain and Singapore has developed flexible sensing films based on silver nanoparticles that can be used to identify the presence of pesticide residue on the surface of agricultural produce in minutes. The research

results were published in *Nanoscale*.

In order to create these sensors, scientists from ITMO, the Ioffe Institute, National University of Singapore and University of Rovira i Virgili combined melamine and a small amount of [silver nitrate](#) in a Petri dish with a small layer of agar gel. Silver nitrate is well-known in the [medical field](#) as an antibacterial agent and is used in photographic engineering as a component of developing agents. Even though the substance contains [silver](#), it is relatively cheap and accessible.

Silver nitrate's reaction with the other components results in the formation of white crystal precipitation. When the Petri dish is exposed to light, the crystals decompose, forming [silver nanoparticles](#), and the chemical reaction is complete. The resulting material is dried carefully, as at this stage, it's very easy to damage. Drying results in lightweight and flexible films, and the entire process takes about a day.

The film's operating principle is simple. A piece of it is applied to a fruit and wetted with alcohol in order to gather pesticide molecules on the film's surface and is then put into a spectrometer. The change in the optical response, the form and character of spectra in the graphs, indicates whether there is pesticide on the product surface or not.

"We compared the detection threshold of our sensors with that of classical instruments: chromatographic, polarographic, voltammetric, and other methods for detecting pesticides. Our method is cheaper, quicker and more mobile. What's more, there already exist portable and affordable devices that can be used to check the response of our films. We plan to continue the experiments on identifying other types of pesticides at various concentrations," says Anastasia Nenashkina, head of the project and a Ph.D. student at ITMO University.

More information: Anastasia Nenashkina et al. Silver melamine thin

film as a flexible platform for SERS analysis, *Nanoscale* (2021). [DOI: 10.1039/D0NR08543J](https://doi.org/10.1039/D0NR08543J)

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