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Detection of nanoparticles by surface-enhanced Raman microscopy

Nanoparticles are challenging to detect and image due to their size. While methods such as dynamic light scattering, nanoparticle tracking or scanning electron microscopy are commonly used to detect and determine the size of nanoparticles, either high concentrations are required or it is difficult to identify the type of particle that is detected.

Although Raman scattering is able to give information about the detected molecule, it is an inherently weak process, with only about one in 10^8 photons of the excitation beam contributing to the Raman signal. However, this signal can be enhanced by the excitation of surface plasmons on substrates like gold nanostructures.

Here, we show that by employing surface-enhanced Raman microscopy, we can enhance the Raman signal in such a way that single nanoparticles can be detected and by looking at the Raman fingerprint we can determine the type of nanoparticle that is observed.
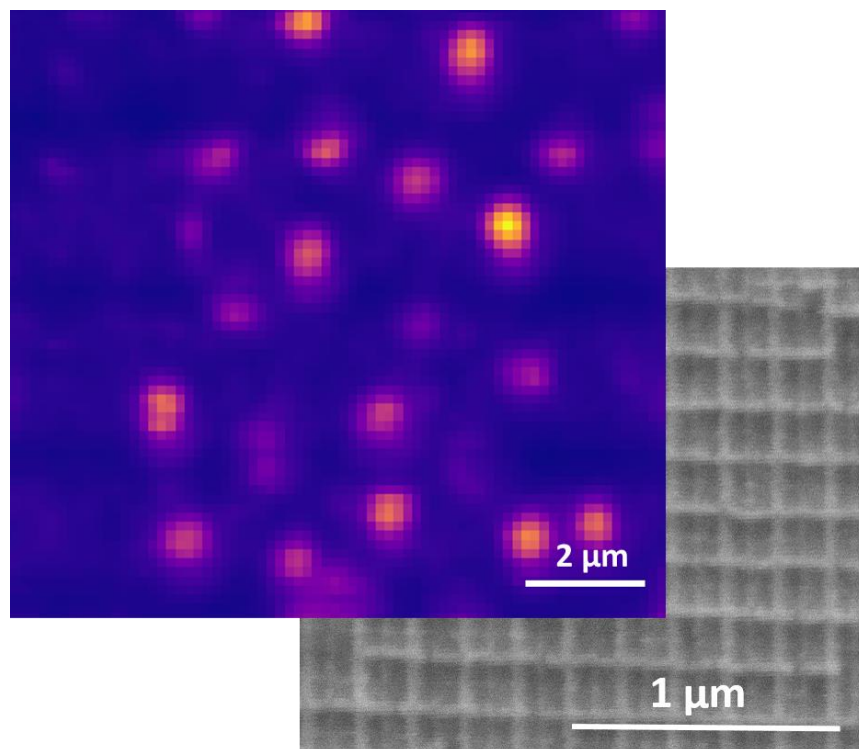
Figures

Figure 1: Surface-enhanced Raman substrate (right SEM image) and surface-enhanced Raman microscopy image (left) of polystyrene nanoparticles.