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Surface-enhanced Raman scattering of the adsorption of pesticide endosulfan on gold nanoparticles

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Abstract

The absorption of pesticide endosulfan on the surface of gold nanoparticles results from the formation of micrometric structures (1–10 μm) with irregular shape because of the aggregation of individual particles. Such aggregation of gold nanoparticles after absorption of pesticide shows a surface-enhanced Raman scattering (SERS) spectrum, whose intensity depends on the concentration of endosulfan. In addition, the discoloration of the colloidal solution and a diminishing of the intensity of the surface plasmon resonance absorption from individual particles were observed by UV-visible spectroscopy. At the same time, a second band between 638 and 700 nm confirms the formation of aggregates of gold nanoparticles as the concentration of endosulfan increases. Finally, we used the SERS intensity of the S–O stretching vibration at 1239 cm^{-1} from the SO_3 group as a measure of concentration of pesticide endosulfan. This method could be used to estimate the level of pollution in water by endosulfan in a simple and practical form.

Keywords: Gold nanoparticles, endosulfan, aggregation, SERS



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