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**Rapid and sensitive detection of malachite green in aquaculture water by electrochemical preconcentration and surface-enhanced Raman scattering**

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**Abstract**

A highly sensitive and rapid method of in-situ surface-enhanced Raman spectroscopy (SERS) combining with electrochemical preconcentration (EP) in detecting malachite green (MG) in aquaculture water was established. Ag nanoparticles (AgNPs) were synthesized and spread onto the surface of gold electrodes after centrifuging to produce SERS-active substrates. After optimizing the pH values, preconcentration potentials and times, in-situ EP-SERS detection was carried out. A sensitive and rapid analysis of the low-concentration MG was accomplished within 200s and the limit of detection was  $2.4 \times 10^{-16}$  M.

Graphical abstract

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