

Development and patent strategy for promoting industrial use of SERS

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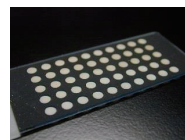
Summary

We offer a wide variety of SERS (surface enhanced Raman spectroscopy) platforms suitable for detection of chemical species suspended in solution and adsorbed on a solid surface, in user-friendly packages at affordable costs.

Content

【Background】

Commercial SERS plates are now available, but the cost of single-use plates is still rather high, roughly \$50. If plates can be provided more economically and used in conjunction with a portable spectrometer dedicated for SERS measurements, use of SERS in industry is expected to increase dramatically. Beside meeting cost issues, we tailor our device configurations to suit specific modes of operation for ease of use and attempt to increase the shelf life. We have strategically filed numerous patent applications to achieve the above goal.



【Methods of preparing noble metal nanostructures】

- (1) Vacuum deposition of a noble metal on a surface-adsorbed monolayer of monodisperse nanospheres, random FON (film on nanosphere)
- (2) Galvanic displacement reaction of cap-shaped base metal nanoparticles in AgNO_3 for formation of nano-dendrites
- (3) Decoration of butterfly wing scales with a noble metal (biomimic approach)

【Modes of operation】

- (1) Application of a low-volume sample (under $10 \mu\text{L}$) on our standard SERS plate or with a preconcentration based on a surrounding superhydrophobic surface. (**low-volume pure liquid sample**)
- (2) Pressing of a FlexiSERS (a flexible surface coated with noble metal nanostructures) onto a solid surface for transfer of surface-adsorbed chemical species. (**residual pesticides on agricultural produces**)
- (3) Introducing a fluid sample into a screw-based microfluidic device incorporating noble metal nanostructures. (**flowing liquid sample**)

【Patents】

Japanese patents: 5494954, 5709039, 5812459, 5967756, 5988239, 6368516, and 6423137 in addition to other pending applications. They can be classified into three categories: fundamental methods of fabricating nanostructures, device configurations for specific modes of operation and multifunctionality.

Special features and concrete applications

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Patents and publications

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