Spatially resolved surface enhanced Raman scattering for multiplex identification of antibody-antigen interaction

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ABSTRACT

Accurate diagnosis of human diseases at an early stage is crucial for efficient medical treatment and human health. Most complicated diseases such as cancer need high-throughput multiplex analysis to provide an overall profile, but traditional fluorescence technique undergoes various limitation in modern bioanalysis. Raman scattering and surface enhanced Raman scattering (SERS) have shown technical advantages in multiplex analysis associated with their narrow vibrational spectrum. Over the last couples of years, we have explored the development of Raman and SERS techniques for bead-based multiplex analysis. A series of monodisperse and surface functionalized Raman and/or SERS active polymer microbeads have been developed. These beads have distinguished Raman signatures and can be readout through Raman measurements, and the surface functional groups render it possible for bioconjugation. On the other hand, SERS tags can be easily prepared in the presence of gold nanoparticles. Bead-based Raman immunoassays can be established by mixing polymer microbeads, SERS tags and analyte samples for label-free multiplex analysis. Raman and SERS pave a potential direction for future high-sensitive and high-throughput diagnosis of complex human diseases.