SERS Gene Probes: Frontiers in Medical Diagnostics

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Abstract

We describe the development of nanostructures substrate technology for surface-enhanced Rman scattering (SERS) applications. We discuss the development of a variety of sensors and a multi-label DNA mapping technique using the surface-enhanced Raman scattering (SERS) method and instrumentation. The technology uses DNA gene probes based on SERS labels for gene detection and DNA mapping. The detection method uses nanostructured metallic substrates as SERS-active microarray platforms. The surface-enhanced Raman gene (SERGen) probes can be used to detect DNA targets via hybridization to DNA sequences complementary to these probes. The probes do not require the use of radioactive labels and have great potential to provide sensitivity, selectivity and excellent label-multiplex capability. Advanced instrumental systems designed for spectral measurements and for multi-array imaging are described. The usefulness of the SERGen approach and its applications in biomedical diagnostics, high-throughput analysis, in DNA mapping and sequencing as well as in nanoprobe sening applications are discussed.

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