

Development of Surface-Enhanced Raman Spectroscopy-Active Gelatin Based Hydrogels for Label Free Detection of Bio-Analytes

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Abstract : Hydrogels are a macromolecular network of hydrophilic copolymers with physical or chemical cross-linking structures with significant water uptake capabilities. They are a promising substrate for surface-enhanced Raman spectroscopy (SERS) as they are both flexible and biocompatible materials. Conventional SERS-active substrates suffer from limitations such as instability and inflexibility, which restricts their use in broader applications. Gelatin-based hydrogels have been synthesised in a facile and relatively quick method without the use of any toxic cross-linking agents. Composite gel material was formed by combining the gelatin with simple polymers to enhance the functional properties of the gel. Gold nanoparticles prepared by a reproducible seed-mediated growth method were combined into the bulk material during gel synthesis. After gel formation, the gel was submerged in the analyte solution overnight. SERS spectra were then collected from the gel using a standard Raman spectrometer. A wide range of analytes was successfully detected on these hydrogels showing potential for further optimization and use as SERS substrates for biomedical applications.

Keywords : gelatin, hydrogels, flexible materials, SERS

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