

Thrombin Detection Using Aptamers and Surface Enhanced Raman Spectroscopy (SERS)

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Surface enhanced Raman spectroscopy (SERS) is a unique readout tool for ultrasensitive, high throughput immunoassays. This presentation extends the general facility of SERS to the recognition capabilities of aptamers. It specifically uses a thrombin binding aptamer (TBA) in a sandwich-type assay for the detection of thrombin. Thrombin is extracted from solution onto a capture substrate that utilizes gold thiolate chemistry to create a mixed monolayer of TBA and mercaptohexanol. The thrombin is then labeled with an extrinsic Raman label (ERL) consisting of 60-nm gold nanoparticles, a Raman reporter molecule, and TBA. In exploring this strategy, several experimental conditions were examined, including salt concentration, monolayer deposition time and concentration, blocking agents, pH, and buffer composition. The aptamer-based assay was also compared to those employing monoclonal antibodies (mAbs) for thrombin to contrast performance. These findings, along with issues related to nonspecific adsorption and methods for ultra-low levels of detection will be detailed.

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