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Raman spectroscopy and gold thin film for biosensing and detection

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ABSTRACT:

Raman spectroscopy is commonly used for sample characterization in biology because vibrational information is very specific to the chemical bonds in molecules. This makes it an attractive approach for identification of biological materials such as toxins, viruses or even intact bacterial cells. In addition, Raman spectroscopy has a unique capability of providing label-free intrinsic chemical information, such as molecular bonds in living biological samples at tissue, cellular or subcellular resolution. However, Raman signals are weak and acquiring a spectrum with good signal to noise ratio requires long acquisition time. To overcome this disadvantage of low signal intensities from most biomolecules, enhancement effects are utilized. In this study, a home built Raman spectroscopy optical system combined with a gold thin film deposition was used to detect the HIV gp41 antibody. The Raman system makes use of 785 nm diode laser as excitation source and an Andor CCD camera as detection system. In addition, we report on Raman results obtained with HIV gp41 antibody using a gold thin film deposition substrate. We could observe significant enhancement of Raman signal from the gold thin film layer deposition. These findings indicate the potential application of Raman spectroscopy in rapid biosensing detection.