The efficiency of surface plasmon resonance in measuring human immunodeficiency virus concentrations

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Surface plasmon resonance is a label free optical detection technique, which responds to refractive index variations that are induced by molecular binding incidents or binding affinities. This occurrence takes place when electrons on a thin metal film are excited by the light directed at an incident angle and travel parallel to the film. The angle of incidence that triggers surface plasmon resonance is linked to the refractive index of the material and even an insignificant change in the refractive index will be detected due to the sensitivity of the method. Because of its sensitivity, this technique is used as a real-time analytical approach that can be used for many different applications such as investigating the antibody-antigen affinity. In this study, surface plasmon resonance and localized surface plasmon resonance were investigated for their efficiency in detecting human immunodeficiency virus concentrations. This was achieved by functionalizing gold coated slides using an antibody against the surface protein of the human immunodeficiency virus. To the functionalized gold coated surface, different viral concentrations were added. The samples were then analyzed on home-built surface plasmon resonance and localized surface plasmon resonance biosensing systems. The results showed that the systems detected differences in viral concentrations as demonstrated by resonance curve shifts and varying transmission intensities. These findings will used towards the development of an optical biosensor to be used at point of care system for the detection of viral load in resource limited settings.