Contribution ID: **422** Type: **Poster Presentation**

The detection of HIV using plasmonically active colloidal gold nanoparticles

Localized surface plasmon resonance (LSPR) phenomenon occurs when incident light of specific wavelength excites the free electrons on the gold nanoparticles surface, which then leads to the enhancement of the nanoparticle surface electromagnetic field. The enhanced electromagnetic field has a short decay length and is localized in LSPR as opposed to the surface plasmon resonance (SPR) where the activated surface plasmons propagate. The short electromagnetic field decay length in LSPR means that it is highly sensitive to the refractive index changes near the gold nnopaticles surface rather than the bulk refractive index in SPR. This makes this technique efficient particularly to changes induced by subtle interactions.
In this work, LSPR was used to differentiate between samples with HIV and the ones with no HIV. A glass slide was treated with 1% APTES solution in ethanol before depositing a layer of gold nanoparticles. An anti-HIV-gp120 antibody was added as a biorecognition element prior to the addition of the HIV pseudovirus as the analyte. Thereafter the slide was analyzed on an LSPR system using a green LED light.
The results showed that when using 60 nm gold nanoparticles, there was a clear distinction between a sample with the pseudovirus and the one without it as shown by the varying light transmission intensities between the negative sample and the sample with the virus.
This denotes that LSPR is sensitive enough as a label free detection method for virus detection. This can be used for the development of simple and cost effective ways of detecting various diseases in developing countries.

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None

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Primary author: Dr LUGONGOLO, Masixole (CSIR)

Co-authors: Mr MCOYI, Phumulani (CSIR); Ms MNGWENGWE, Luleka (CSIR); Dr OMBINDA-LEMBOUMBA, Saturnin (CSIR)

Presenter: Dr LUGONGOLO, Masixole (CSIR)

Session Classification: Poster Session

Track Classification: Track F - Applied Physics