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Korea develops metal-enhanced fluorescence probes for influenza A virus detection

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The new biosensing system bypasses common problems associated with fluorescence-based lateral flow immunoassay

In recent years, fluorescence-based lateral flow immunoassay (LFI) has gained popularity as a diagnostic tool for viral detection. It is a rapid virus detection platform which uses molecules that glow under special lighting conditions in the presence of a viral load. However, the performance of this detection platform is limited due to several issues related to detection sensitivity.

In a recent study, a team of researchers from the Department of Chemistry at the Gwangju Institute of Science and Technology, South Korea has demonstrated that these fluorescence-based LFIs, when enhanced by gold nanorod (GNR)-based probes, could accurately and rapidly detect an influenza virus protein, without the need for complex diagnostic laboratory equipment.

The team developed Cy5-mSiO_2@GNR probes with core–shell nanostructures for the LFI platform. These probes consist of a GNR core, a mesoporous silica shell (mSiO_2), and the fluorescent molecule cyanine 5 (Cy5). This new biosensing system bypasses common problems associated with fluorescence-based LFI, such as photobleaching of fluorophores and low quantum yields, by leveraging metal-enhanced fluorescence (MEF).

Furthermore, they demonstrated the applicability of optimised MEF probes by incorporating it onto a LFI platform for the detection of influenza A virus (IAV). The biosensing system was able to identify IAV from clinical patient samples with a remarkable accuracy of more than 99%.

According to the researchers, the findings of this research can not only transform rapid testing in healthcare, but its scope can be also extended to other forms of biomolecule diagnostics, with the ultimate goal of improving people's quality of life.