

## High Sensitive Lateral Flow Assay (LFA) Chip Based on Highly-dispersible Fluorescent Silica Nanoparticles

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Several types of nanoparticles for in vitro diagnostics, especially lateral flow assay (LFA) chip have been actively studied and successfully applied to the practical systems. Also, Silica nanoparticles have been spotlighted because of their excellent properties such as biocompatibility, low toxicity, etc. In this study, we found that the surface modification of silica particles with a hydrophilic PVP dramatically increased its dispersibility and stability in water. Silica nanoparticles impregnated with Alexa Fluor 647 were coated with PVP and then functionalized with aldehyde functional groups. Finally, they were conjugated with specific proteins before applied to LFA chips. We demonstrated that PVP-coated fluorescent silica nanoparticles did not aggregated in assay buffers by analysis of z-potential and TEM. Their fluorescence intensity and photostability were evaluated by photoluminescence (PL) spectroscopy. Thereafter, biotin-conjugated silica nanoparticles were applied on NC membrane of LFA chip treated with streptavidin (2ng). We successfully observed the nanoparticles binding peaks around on the spotting area.