

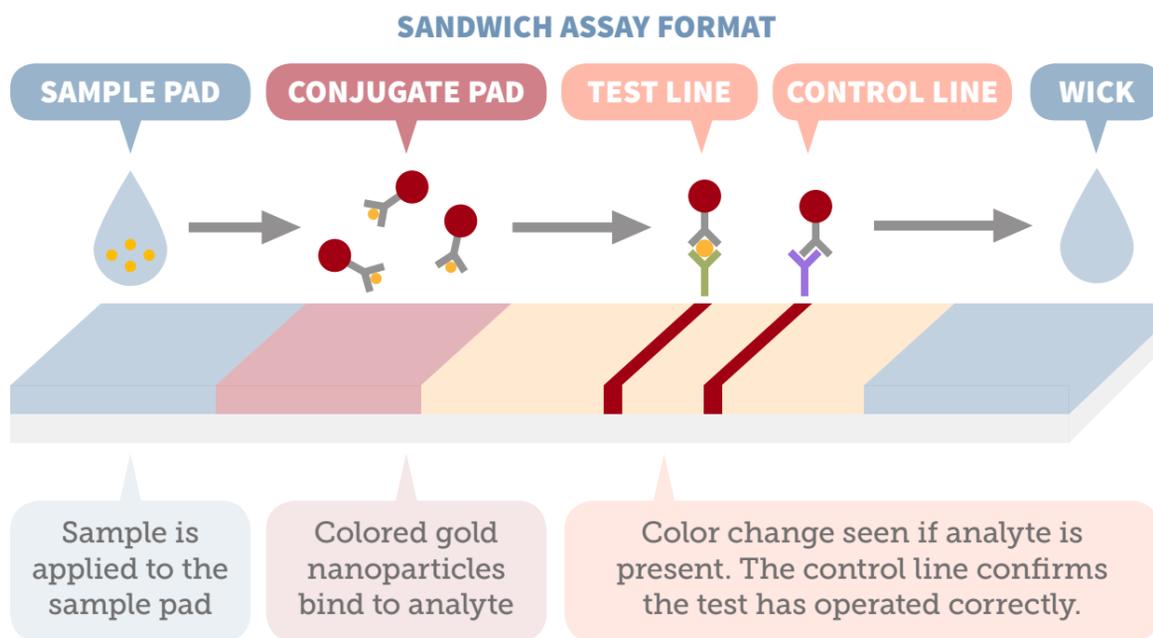
DIAGNOSING DISEASES WITH NOVEL NANOPARTICLES



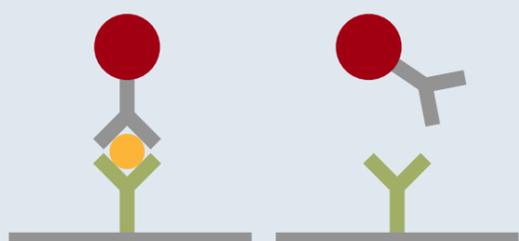
WHAT ARE LATERAL FLOW ASSAYS?

Lateral flow assays are inexpensive simple devices which can be used to test for a target substance (analyte) in a sample without requiring the use of specialized or expensive equipment.

Samples flow from the sample pad and re-solubilize colored nanoparticles. The nanoparticles flow past a test line; if the analyte being tested for is present they generate a signal. The most familiar everyday example of this is the home pregnancy test.



SANDWICH ASSAY FORMAT



✓ ANALYTE

✗ ANALYTE

✓ SIGNAL

✗ SIGNAL

COMPETITION ASSAY FORMAT



✓ ANALYTE

✗ ANALYTE

✗ SIGNAL

✓ SIGNAL

The analyte can generate a signal in a lateral flow assay in two different ways. In sandwich assays, the analyte creates a bridge between the nanoparticles and the surface of the test line. The test line intensity is directly proportional to analyte concentration.

If the analyte is too small to bind to both the nanoparticles and the test line, a competitive format is used. In this case the test line contains immobilized analyte. If the analyte is also present in the sample then the nanoparticles bind to it and in turn do not bind to the analyte on the test line. The test line signal intensity is inversely proportional to the sample's analyte concentration.

For the analyte to bind to the nanoparticles, its chemical partner (an antibody) must be fixed onto the nanoparticle surface. If this is done using covalent bonds, it is more stable than simply passively adsorbing the antibodies to the particles.

Different types of nanoparticles can be used. Gold nanoparticles are commonly utilized, but other types of nanoparticles can increase sensitivity to analytes, meaning that even a small amount of analyte can be detected.

GOLD NANOPARTICLES

Most widely used

Most common size: 40–80 nm

High contrast red signal

GOLD NANOSHELLS

10-20 times more sensitive

Lower density – better flow

Stronger signals (blue-green)

WHY ARE ENGINEERED NANOPARTICLES USEFUL?

Lateral flow assays can be used to test for a range of diseases. Precisely engineered nanoparticles improve the sensitivity of these tests, and help diagnose disease in under ten minutes and for less than a dollar.



Based on materials provided by nanoComposix, manufacturers of precisely engineered and highly characterized nanoparticles.