

# Metal/Latex Nanocomposites “ESCURE™” as Probes for High Performance Diagnostics

## 1. Outline

The global outbreak of COVID-19 in 2019 highlighted the importance of rapid and easy-to-use diagnostic methods. Among them, lateral flow immunoassays (Fig. 1) have gained significant attention in various fields of testing and diagnostics. NIPPON STEEL Chemical & Material Co., Ltd. (NSCM) has developed “ESCURE™” a metal/polymer hybrid nanocomposite particle that significantly enhances the performance of lateral flow immunoassays. Powered by NSCM’s proprietary technology, ESCURE™ enables high sensitivity and reliability in rapid diagnostic applications.

## 2. Characteristics

ESCURE™ is the label for a lateral flow immunoassay, which has a unique hybrid structure that combines a latex microgel with many metal nanoparticles (Fig. 2–4). By combining the features of metal nanoparticles (highly colored) and latex microgels (high fluidity), this brand-new label can be utilized for the development of lateral flow immunoassay with highly sensitive and rapid detection. With its excellence in size uniformity, this material can also be applied to quantitative analysis of lateral flow immunoassay. ESCURE™ is highly versatile and can be widely applied not only as a carrier in various immunoassays, but also for research purposes.

### (1) High sensitivity

Because latex can support a few hundred metal nanoparticles, ESCURE™ can show very strong color despite weak concentration. Therefore, you can more easily create a high sensitivity lateral flow immunoassay test device than when using traditional materials such as colloidal gold nanoparticles and colored latex particles (Fig. 5). For example, it is possible to create devices that can detect influenza or COVID-19 in the early stages of infection.

### (2) Rapid diagnosis

Because the size of ESCURE™ is 370 or 450 nm, greater than that of conventional labeling particles, you have a choice of membranes with higher flow rates. Therefore, you can also develop a rapid detective immunochromatography test with a dramatically improved transfer rate.

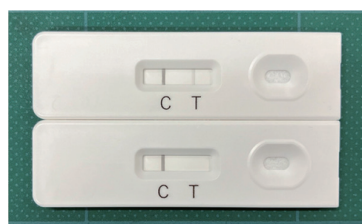


Fig. 1 Images of immunochromatography

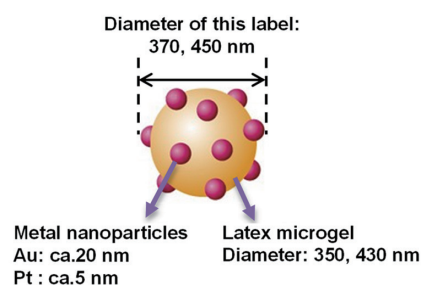


Fig. 2 Schematic illustration of metal nanocomposite particles “ESCURE™”

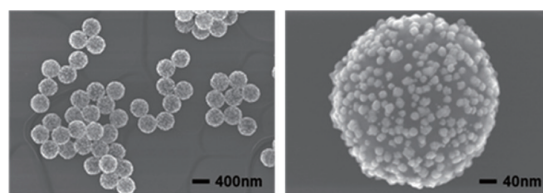


Fig. 3 SEM images of Au nanocomposite particles

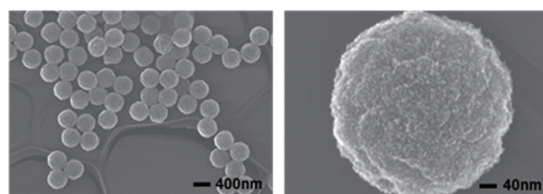


Fig. 4 SEM images of Pt nanocomposite particles

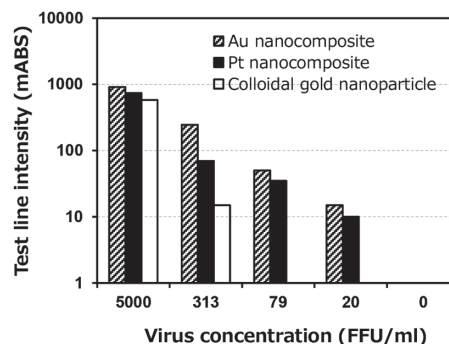


Fig. 5 The optical signal values on the test line obtained after detection of Flu A for 5 min

(3) Quantitative analysis

ESCURE™ is excellent in size uniformity, dispersion stability, and lot-to-lot reproducibility. With its excellence in size uniformity, ESCURE™ can also be applied to quantitative analysis of lateral flow immunoassay.

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