

Supplementary data

Cysteamine-gold coated carboxylated fluorescent nanoparticle mediated point-of-care dual-modality detection of the H5N1 pathogenic virus

Figure S1. Schematic diagram of the lateral flow test strip. TL - test line; CL - control line; NC - nitrocellulose.

Figure S2. Calculations of average diameter and nanoparticle concentrations using the Haiss and Bangs equations.

Figure S3. FTIR analysis of Cys AuNPs, EuNPs and Cys Au-EuNPs.

Figure S4. Zeta potential analysis of Cys Au-EuNPs

Figure S5. Stability analysis of Cys Au-EuNPs

Figure S6. Raw data describing antibody conjugated Cys Au-EuNPs tests conducted under various lysis buffer conditions.

Figure S7. Raw data describing antibody conjugated EuNPs tests conducted under various lysis buffer conditions.

Figure S8. Raw data describing antibody conjugated commercial EuNP FICT conducted with various H5N1 titers under optimized lysis buffer conditions.

Figure S9. Raw data describing antibody conjugated commercial AuNP RDT with various H5N1 titers under optimized lysis buffer conditions.

Figure S10. Raw data describing antibody conjugated Cys Au-EuNP FICT with various H5N1 titers under optimized lysis buffer conditions.

Figure S11. Raw data describing antibody conjugated Cys Au-EuNP RDT with various H5N1 titers under optimized lysis buffer conditions

Figure S12. Raw data describing antibody conjugated Commercial EuNps tested with different H5 subtype viruses using FICT.

Figure S13. Raw data describing antibody conjugated Cys Au-EuNPs tested with different H5 subtype viruses using FICT.

Figure S14. PL intensity of (A) EuNps, (B) EuNPs + Ab conjugate, (C) Cys Au-EuNPs, and (D) Cys Au-EuNPs + Ab conjugate in response to UV irradiation normalized to the control (value of UV exposure over 0 s).

Figure S15. Raw images of fluorescent metals and conjugates.

Figure S1.

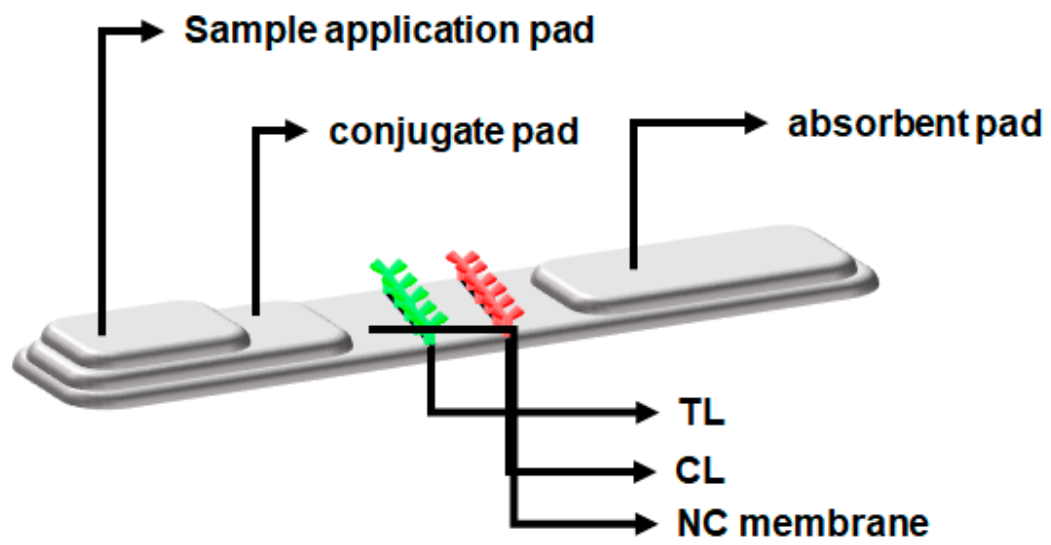


Figure S2.

Cys AuNPs by Haiss equation

$$d = \frac{\ln\left(\frac{\lambda_{spr} - \lambda_0}{L_1}\right)}{L_2}$$

λ_{spr} = wavelength at the peak of the SPR,
 $\lambda_0 = 512$,
 $L_1 = 6.53$,
 $L_2 = 0.0216$

Before coating Cys AuNPs Diameter (d) = ~30nm
After coating Cys AuNPs Diameter (d) = ~80nm

Calculating AuNPs concentration (N = gold nanoparticle/ml)

$$N = \frac{A_{450} \times 10^{14}}{d^2 \left[-0.295 + 1.36 \exp\left(-\left(\frac{d - 96.8}{78.2}\right)^2\right) \right]}$$

A_{450} = absorption at 450 nm,
d = diameter of the NPs

Before coating Cys AuNPs numbers
 $N = 5.514 \times 10^{11}$ nps/mL

After coating Cys AuNPs numbers
 $N = 7.5 \times 10^9$ nps/mL

EuNPs by Bangs equation

EuNPs Diameter (d) = ~100nm
Cys Au-Eu NPs Diameter (d) = ~150nm

$$N = \frac{6 \times 10^{10} \cdot S \cdot \rho_L}{\pi \cdot \rho_s \cdot d^3}$$

N = # microspheres/mL for suspensions in water
S = weight % solids (for 10% solids suspension, S=10)
 ρ_L = density of microsphere suspension (g/mL)
 $\rho_L = 100 \cdot \rho_s / [S(1 - \rho_s) + (100 \cdot \rho_s)]$
 ρ_s = density of solid sphere (g/cm³)
d = mean diameter (μm)

Before coating EuNPs numbers
 $N = 1.803 \times 10^{13}$ nps/mL

After coating EuNPs numbers
 $N = 5.45 \times 10^3$ nps/mL

Figure S3

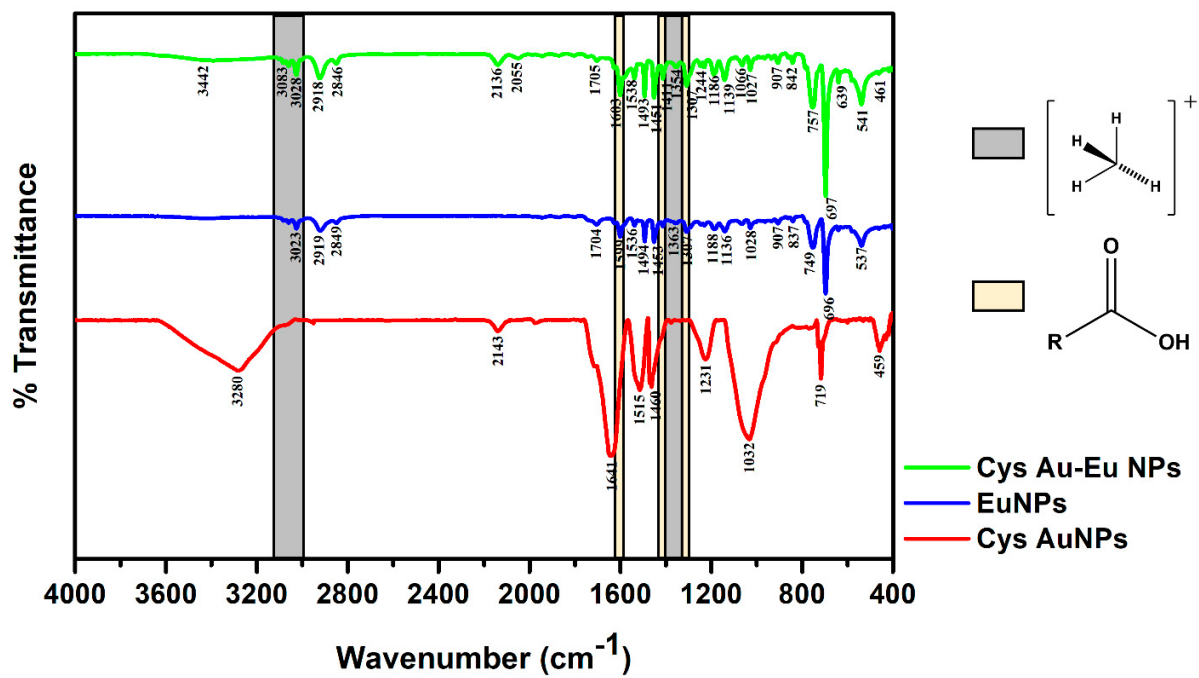


Figure S4

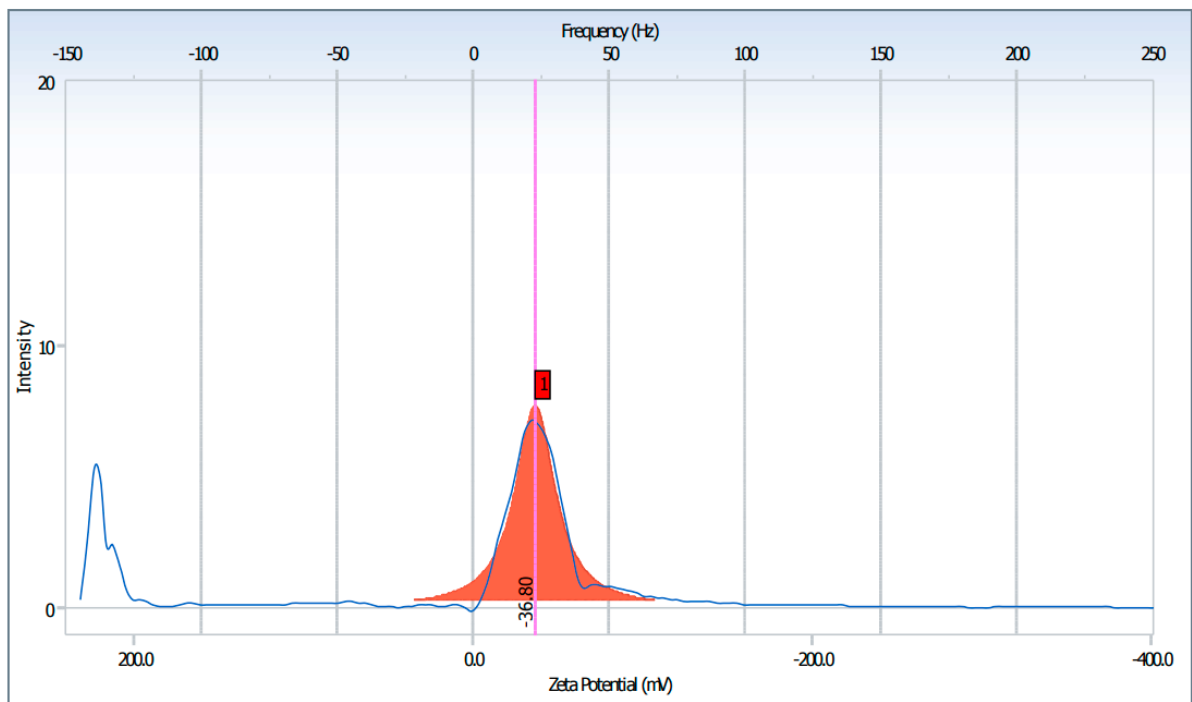


Figure S5.

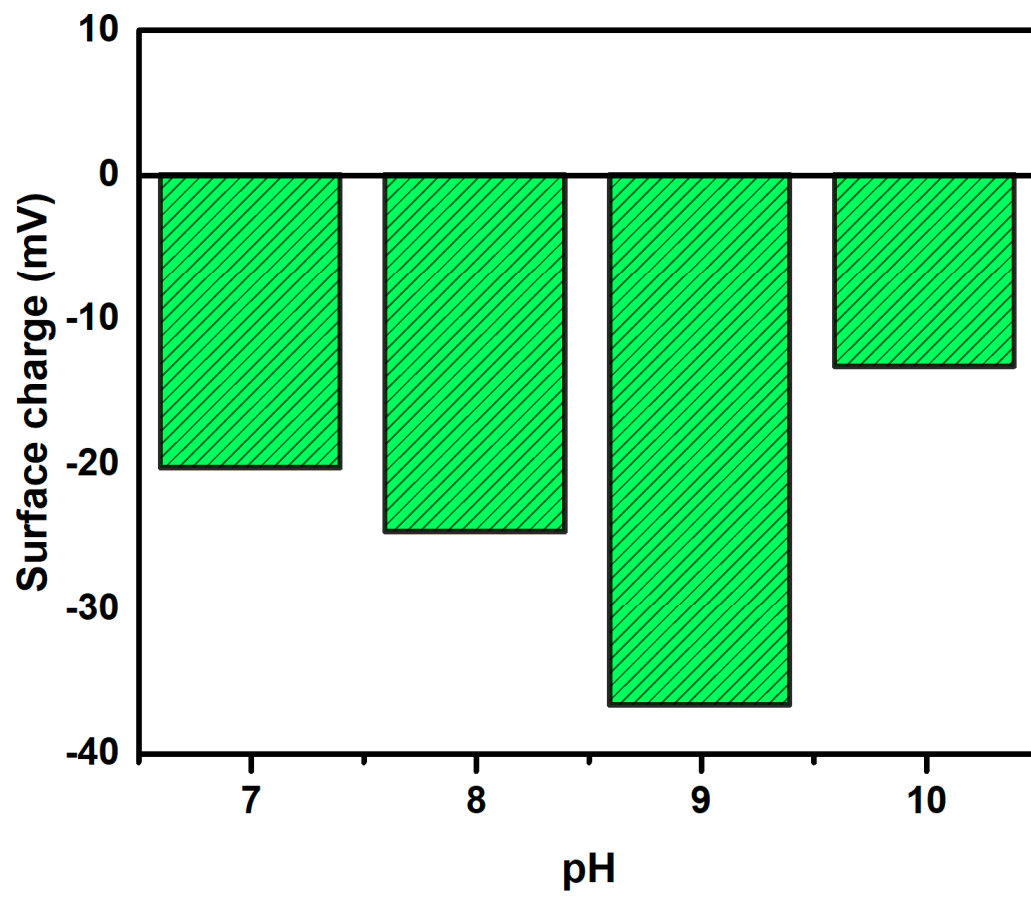


Figure S6.

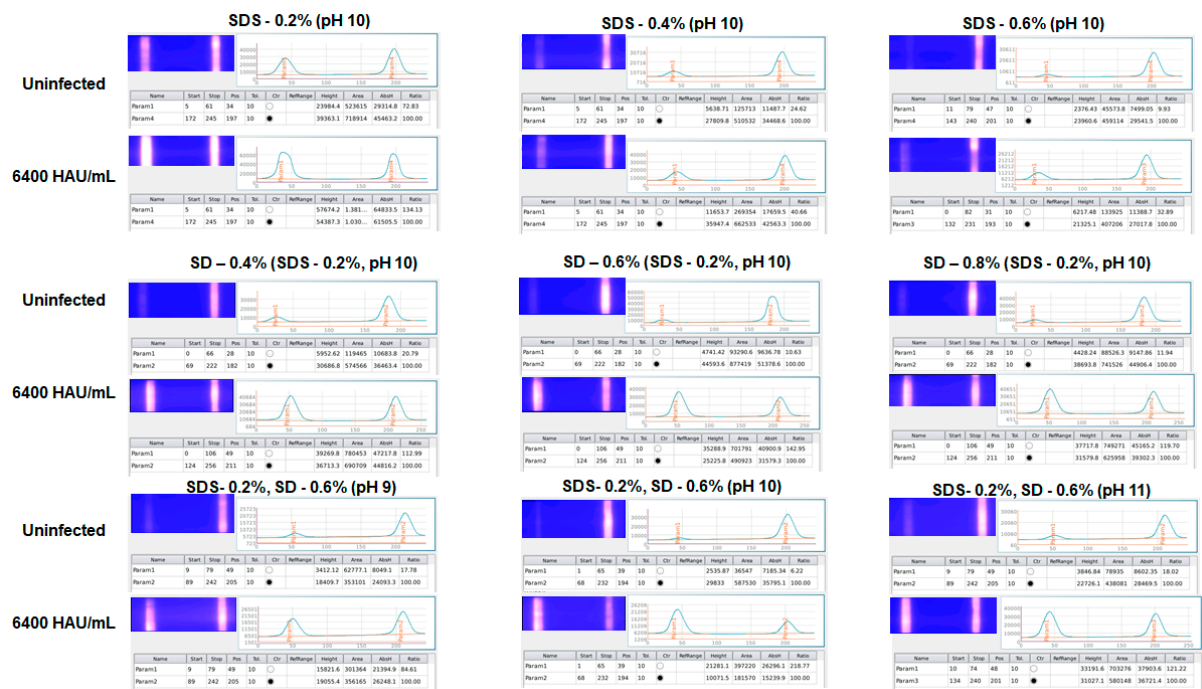


Figure S7.



Figure S8.

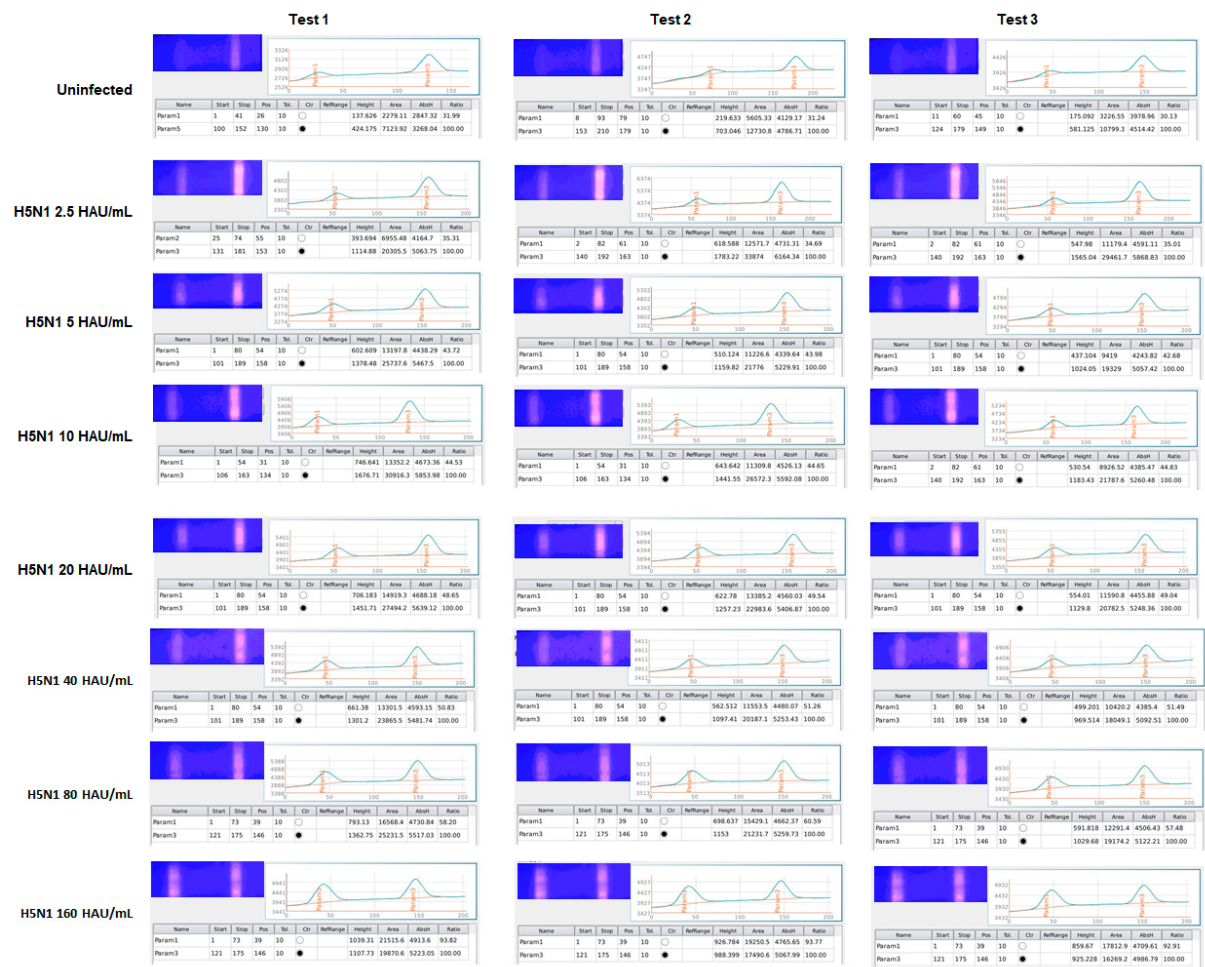


Figure S9.

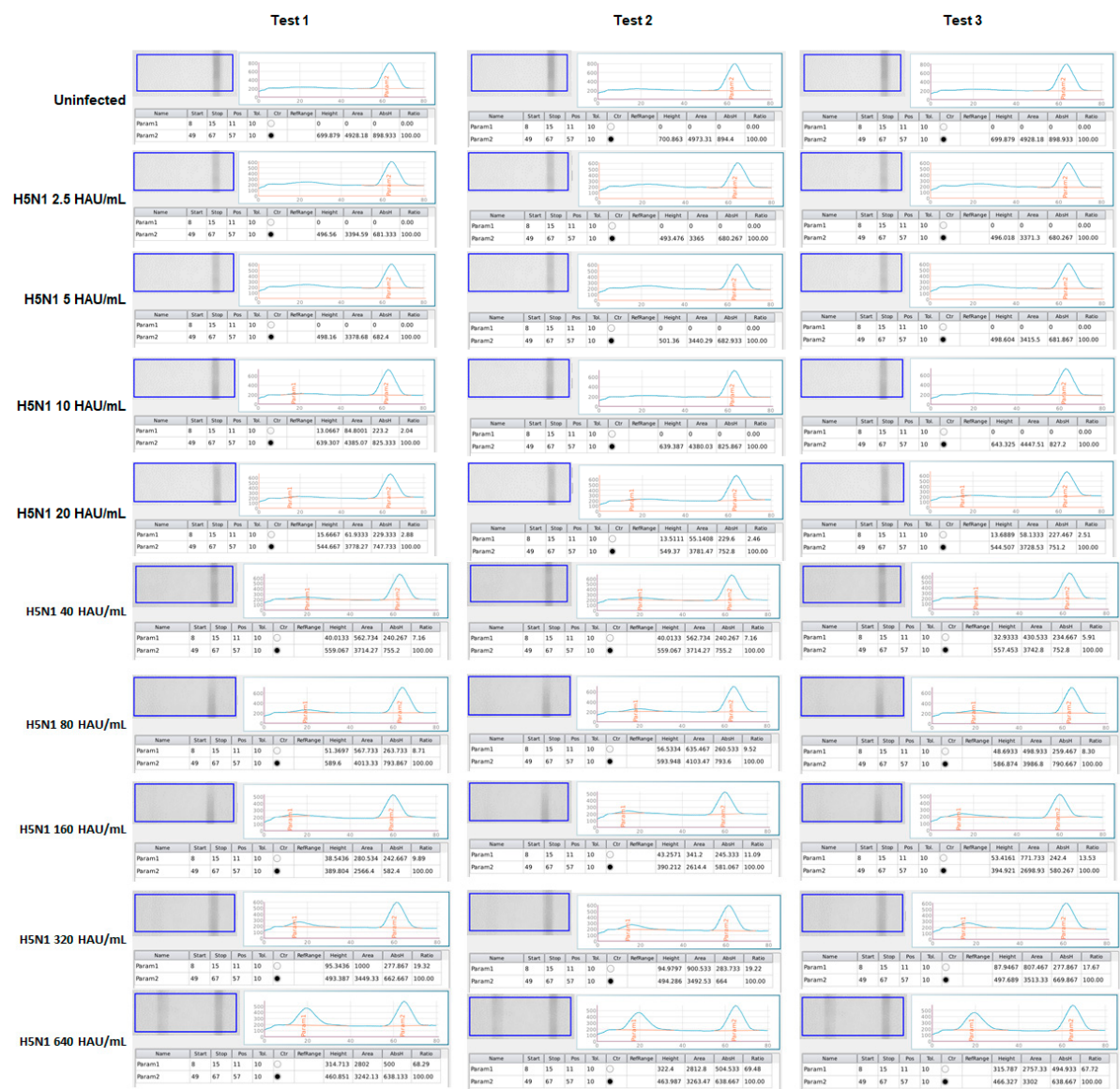


Figure S10.

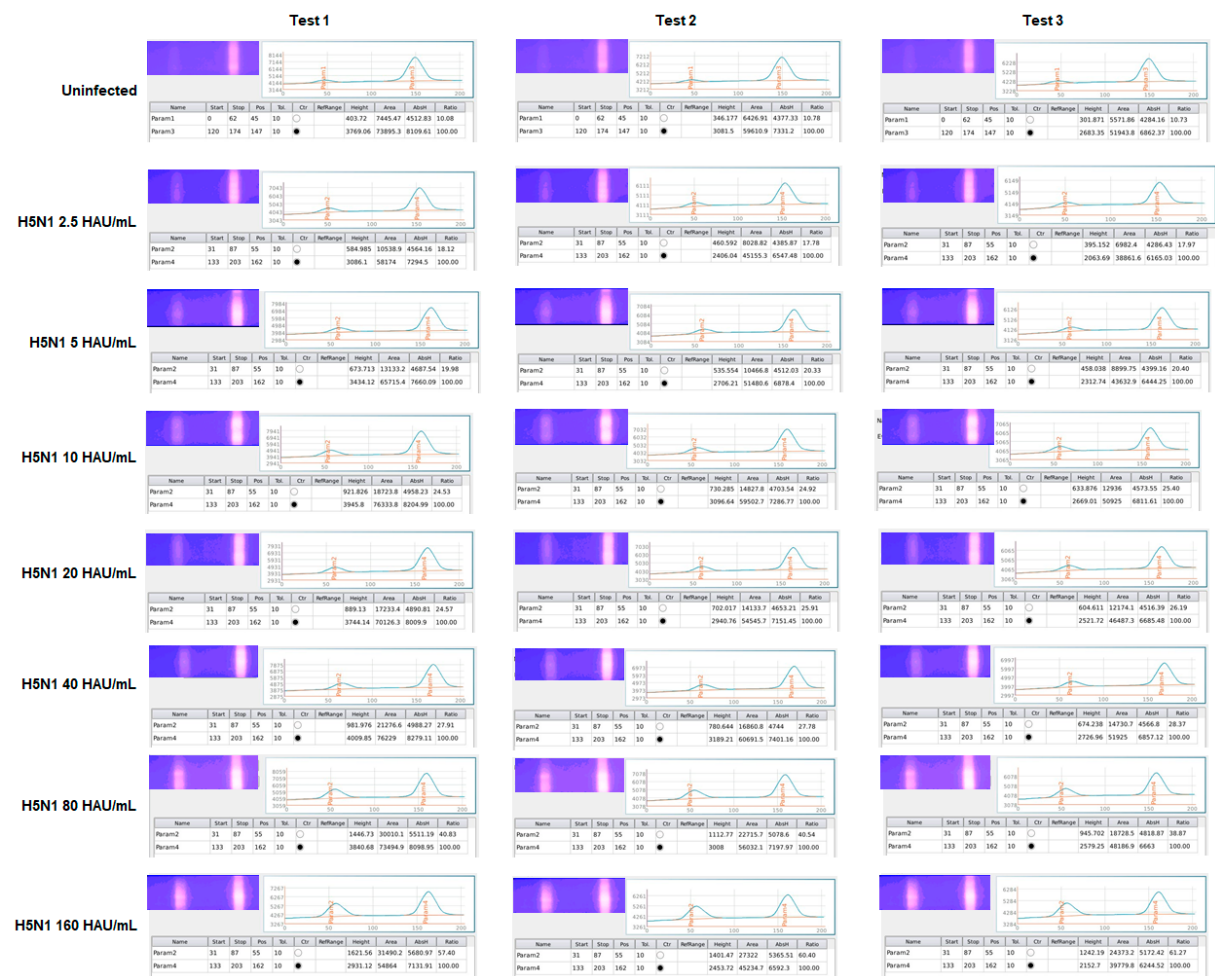


Figure S11.

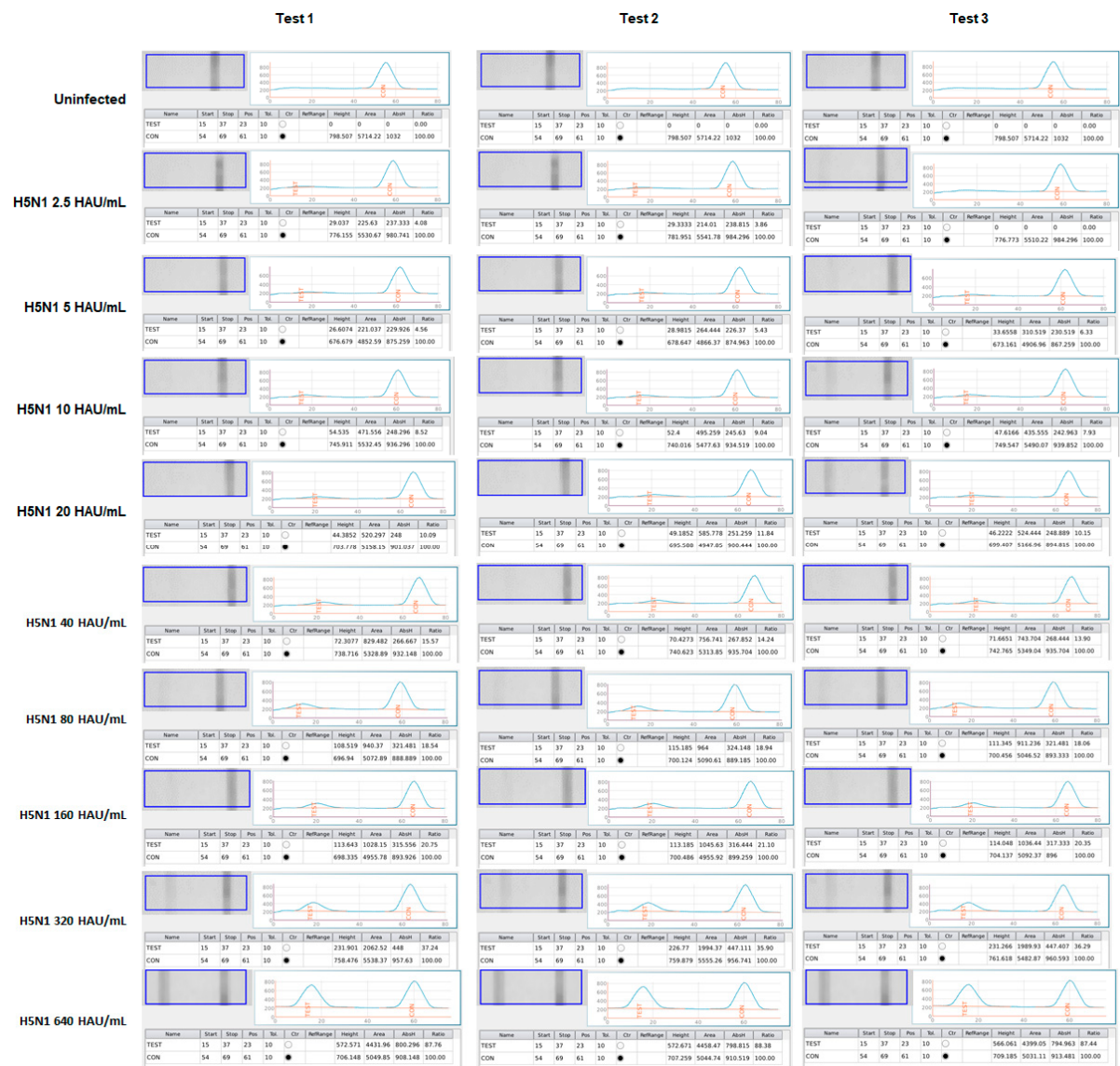


Figure S12.

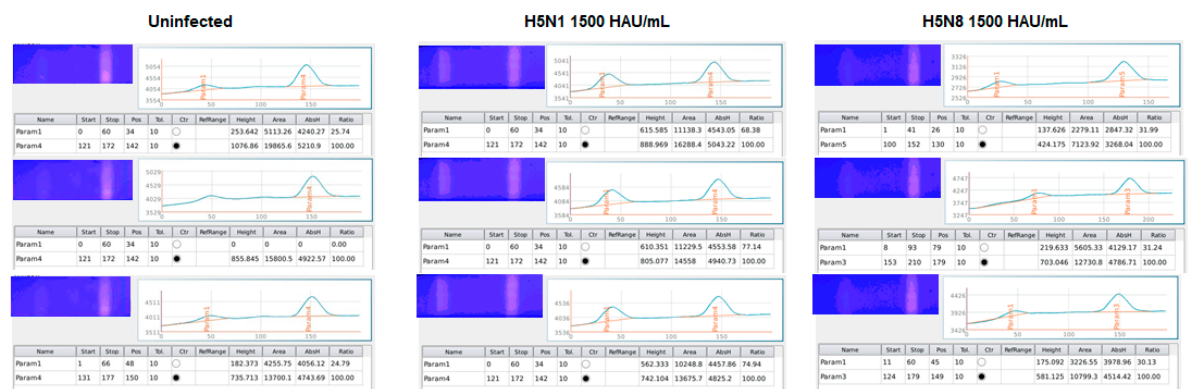


Figure S13.

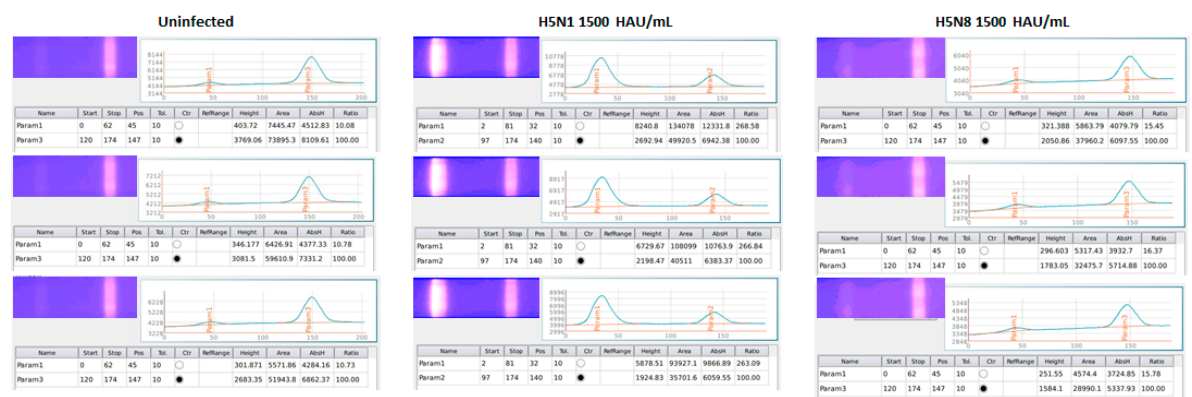


Figure S14.

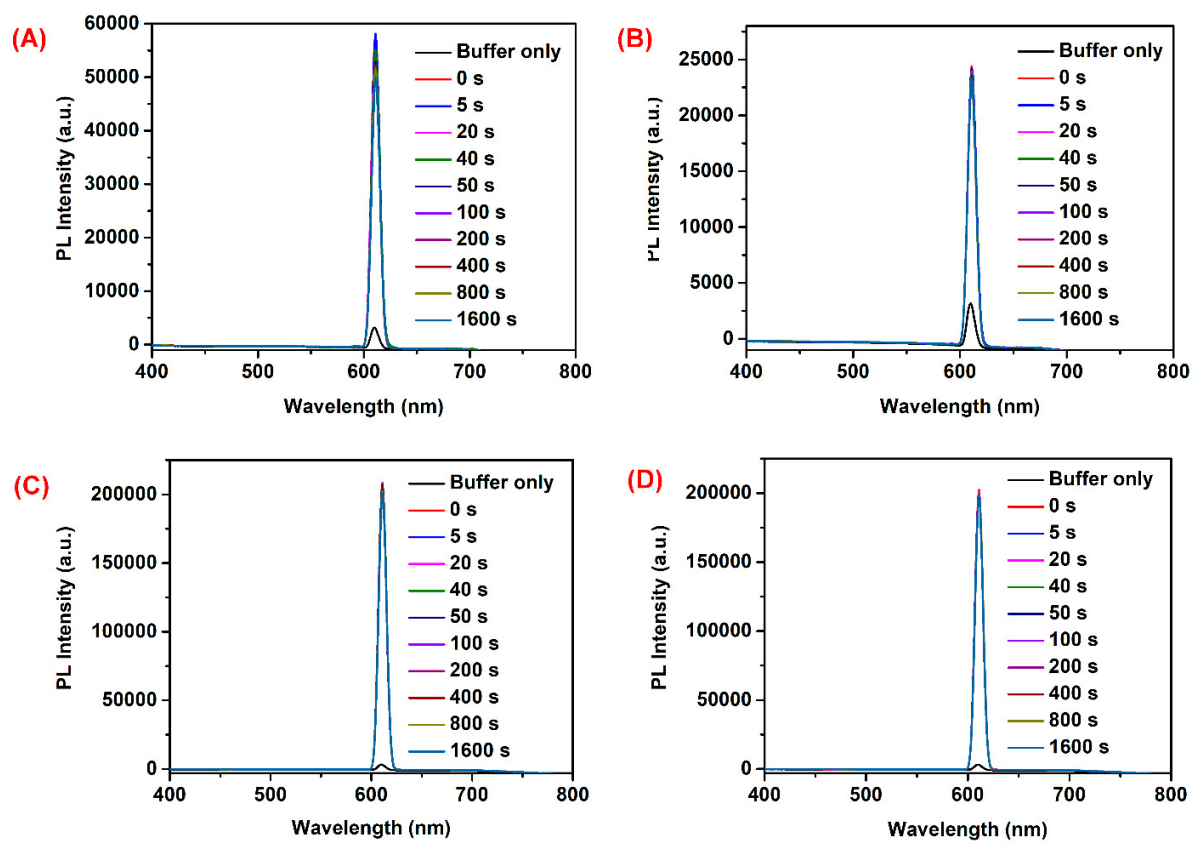


Figure S15.

