1 **Supplementary Data**

2 # Size-Dependent Tuning of Horseradish Peroxidase

3 # Bioreactivity by Gold Nanoparticles

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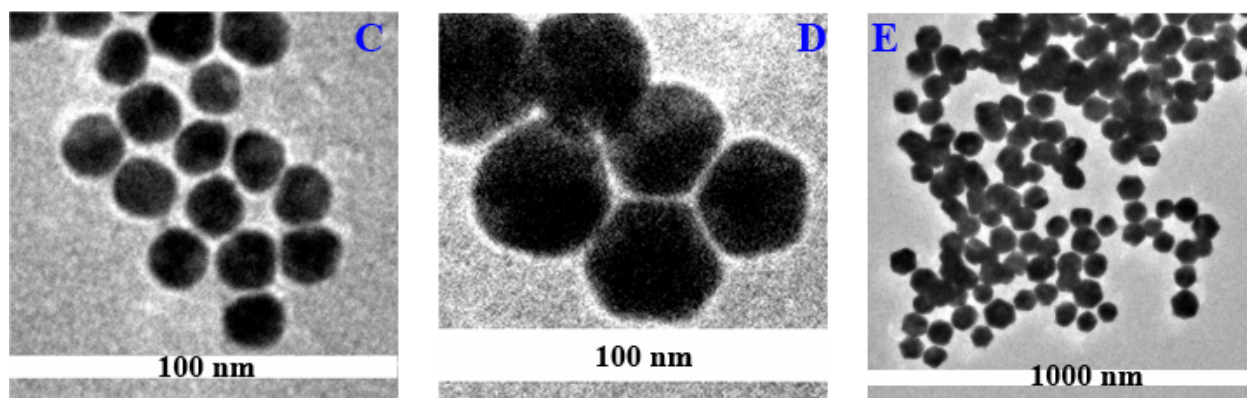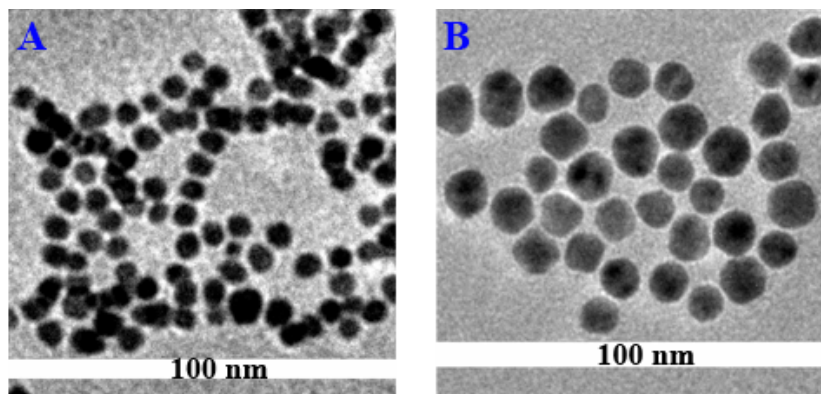
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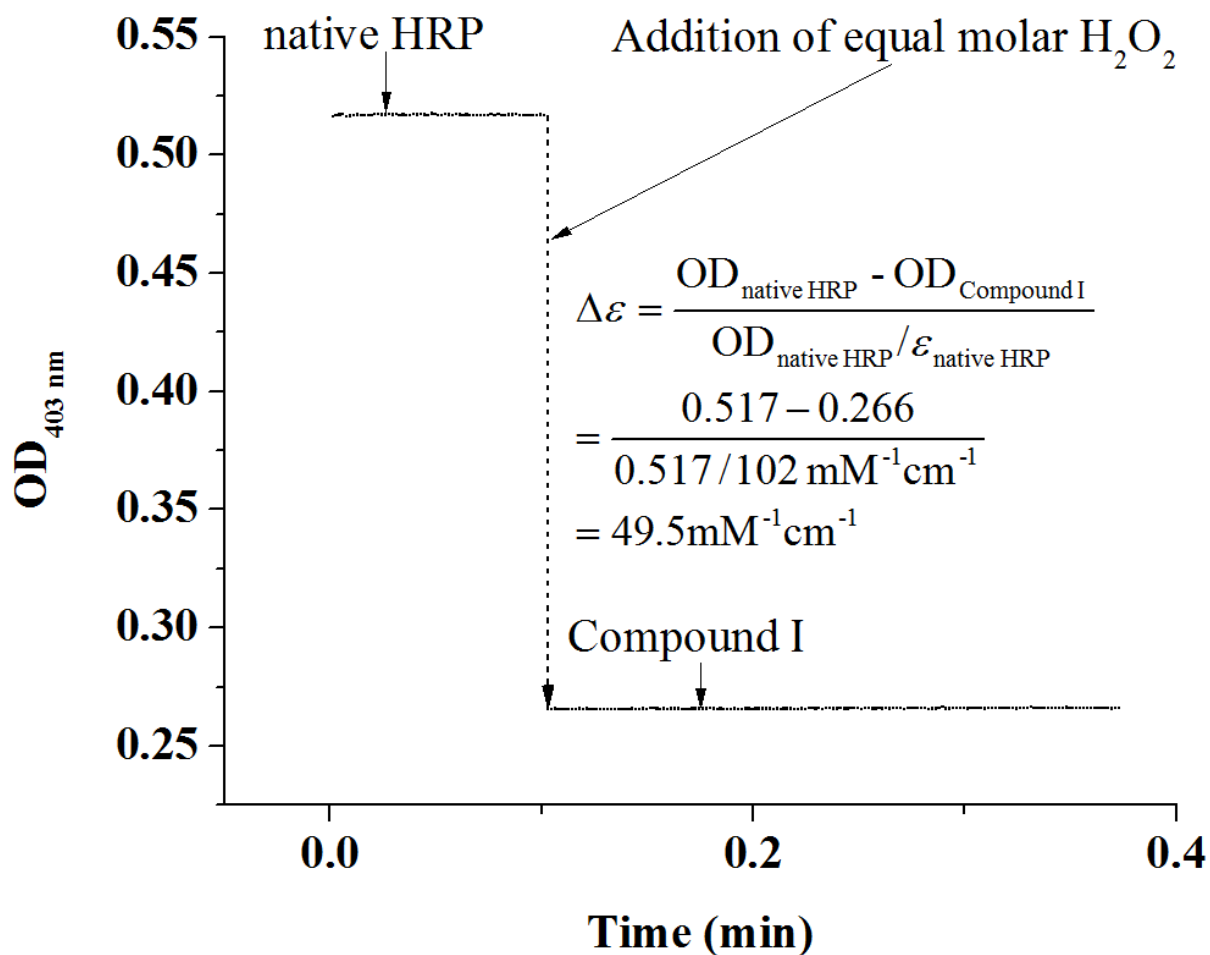14 Tel: 240-402-1991. Fax: 201-436-2624. Email: junjie.yin@fda.hhs.gov

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17 **Fig. S1** TEM images of (A) Au-5nm, (B) Au-10nm, (C) Au-15nm, (D) Au-30nm, and (E) Au-60nm.

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The plot shows OD$_{403\,nm}$ versus Time (min), with a curve labeled "native HRP" at approximately 0.517, dropping to "Compound I" at approximately 0.266 upon "Addition of equal molar H$_2$O$_2$".

$$\Delta\varepsilon = \frac{OD_{\text{native HRP}} - OD_{\text{Compound I}}}{OD_{\text{native HRP}}/\varepsilon_{\text{native HRP}}}$$

$$= \frac{0.517 - 0.266}{0.517/102 \text{ mM}^{-1}\text{cm}^{-1}}$$

$$= 49.5 \text{mM}^{-1}\text{cm}^{-1}$$

19

20 **Fig. S2.** Calculation of Δε (the difference extinction coefficient at 403 nm of native HRP minus Compound I) based on

21 the time-dependent changes in absorption of 5 µM HRP in 10 mM PBS (pH 7.2) at 403 nm before and after the
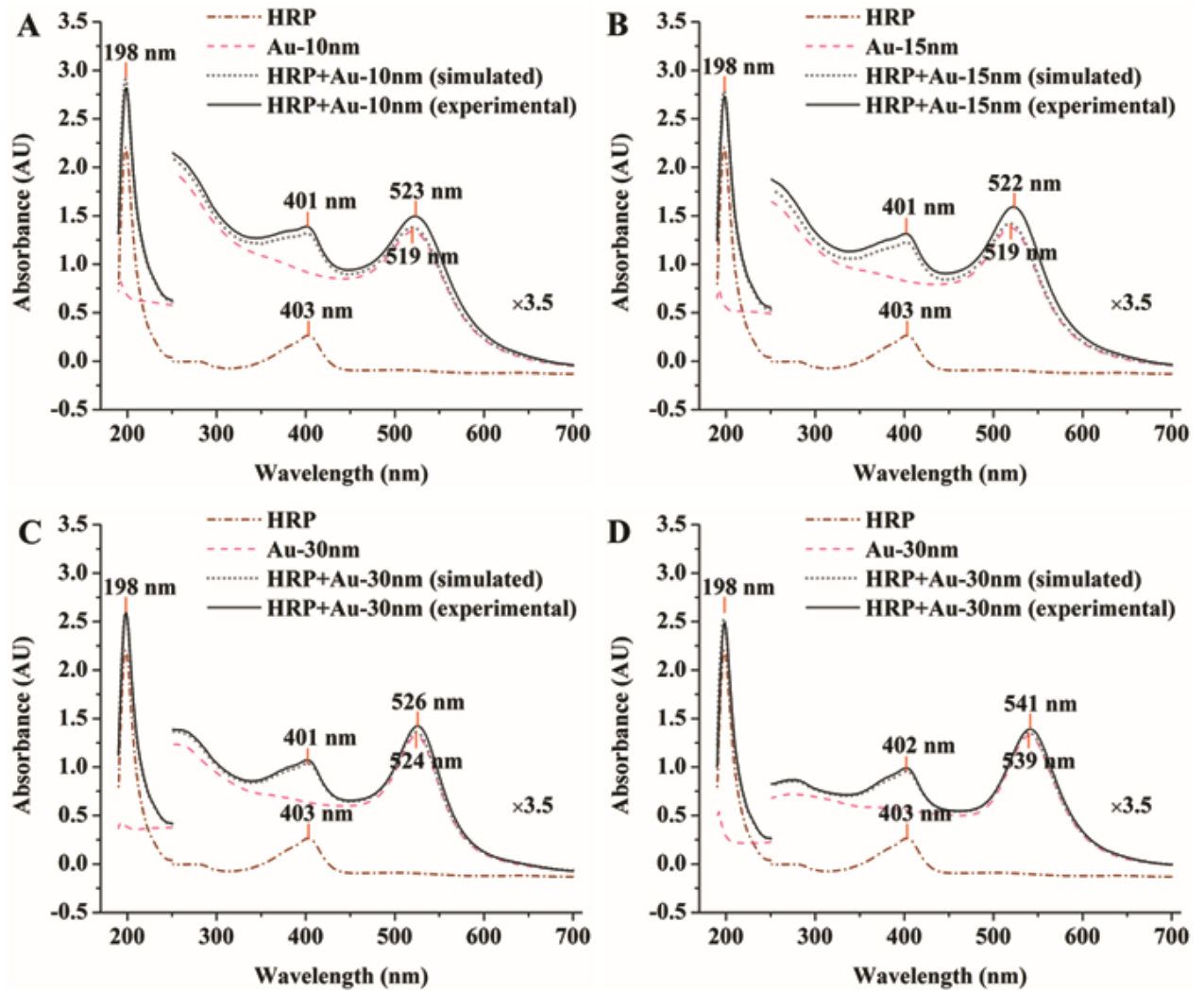
22 addition of equal molar H$_2$O$_2$.

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$[O_2] = 2099 \times$ Line width (G) - 221

$R^2 = 0.99$

O$_2$ saturated

Air saturated

N$_2$ purged
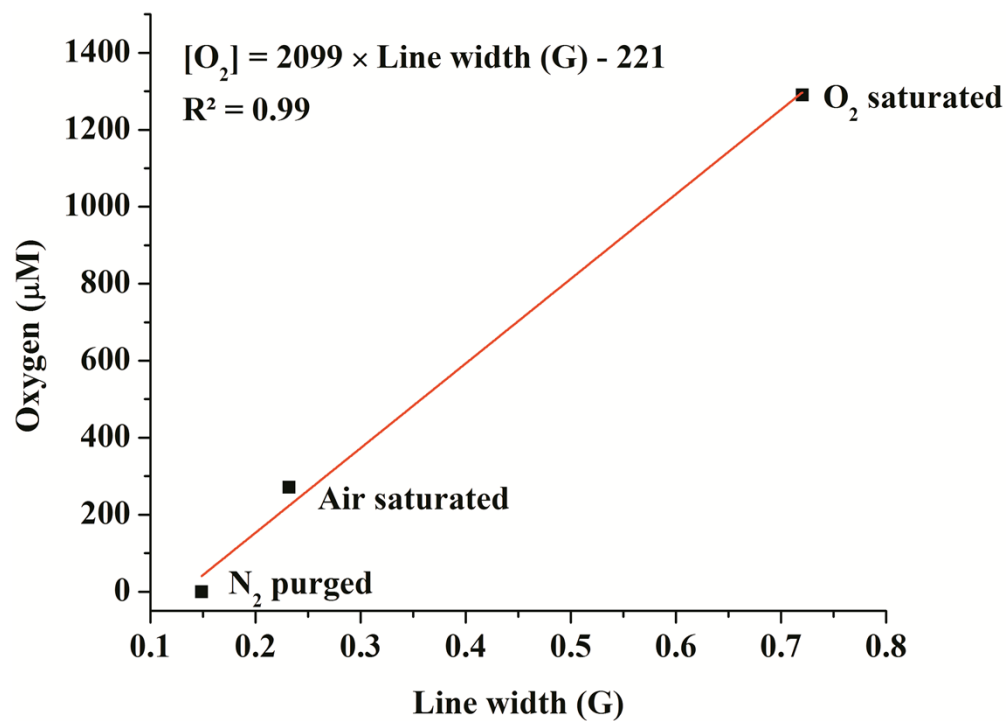
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25 **Fig. S3.** The linear relationship between line width of ESR spectra and O_2 concentration in solutions. In the O_2

26 saturated solution, the O_2 concentration is 1229 μM. While in the air saturated solution, the O_2 concentration is 258
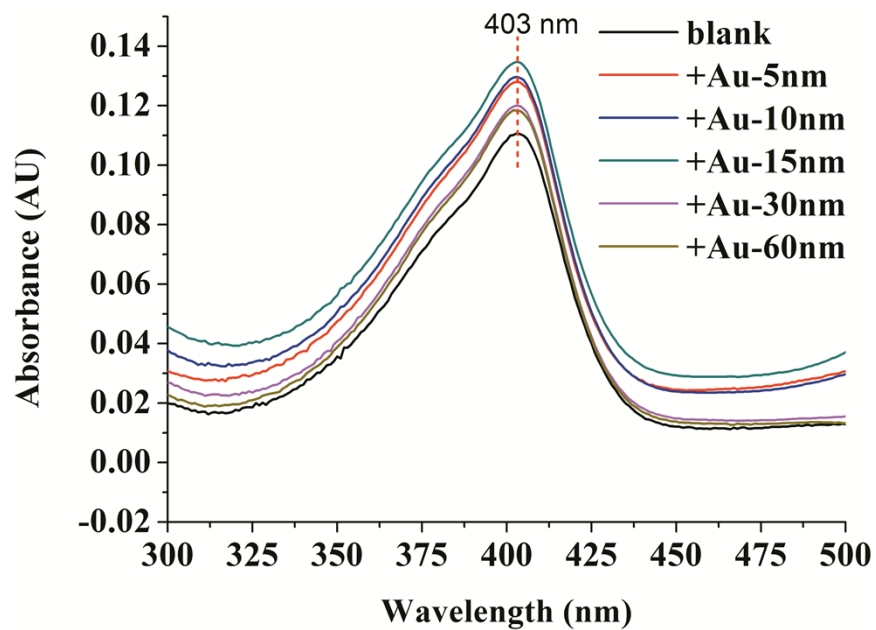
27 μM.

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Fig. S4. The UV-Vis spectra of HRP (1.1 µM), AuNPs (A, Au-10nm; B, Au-15nm; C, Au-30nm; D, Au-60nm) (OD = 0.4), and their mixture in 10 mM PBS (pH 7.2). The simulated spectrum was the result of adding of the spectra of HRP and Au-5nm. The background spectrum of the buffer has been subtracted.

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Fig. S5. The UV-Vis spectra of HRP (1.1 µM) with or without the presence of AuNPs (Au-5nm, Au-10nm, Au-15nm,

Au-30nm, and Au-60nm) (OD = 0.4) in 10 mM PBS (pH 7.2). The spectra in the presence of AuNPs were the results

of the subtraction of the spectra of AuNPs from those of the mixture of AuNPs and HRP. The background spectrum of

the buffer has been subtracted.

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