

## Supplementary Information

Figure S1. The UV spectrum of 10 nm and 20 nm AgNPs.

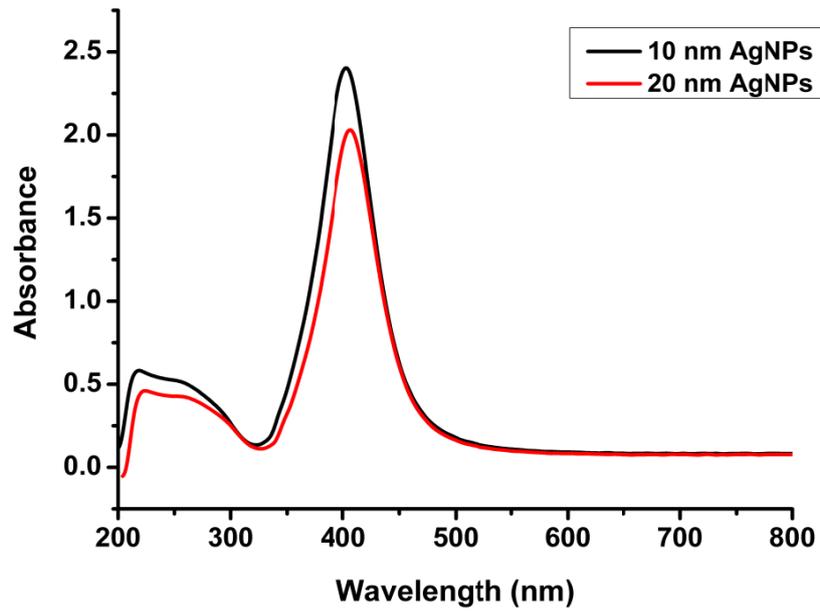
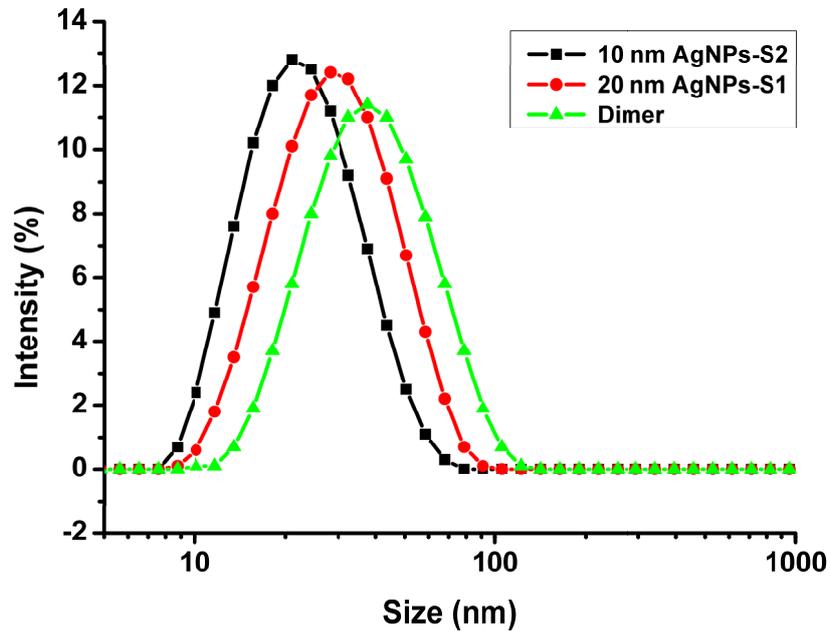
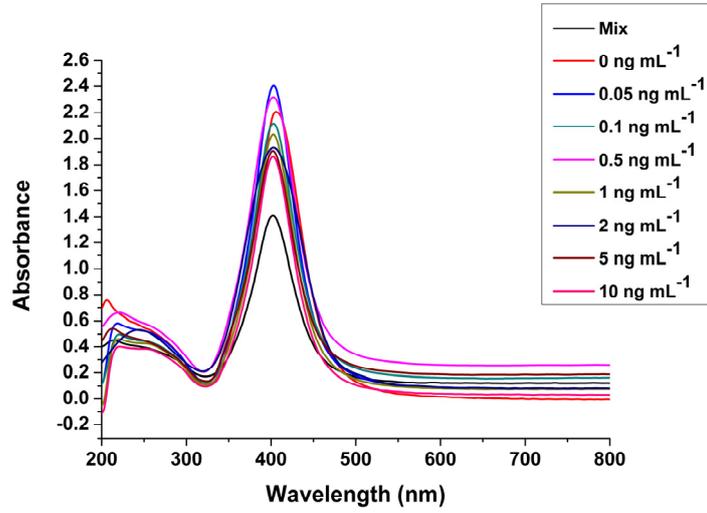


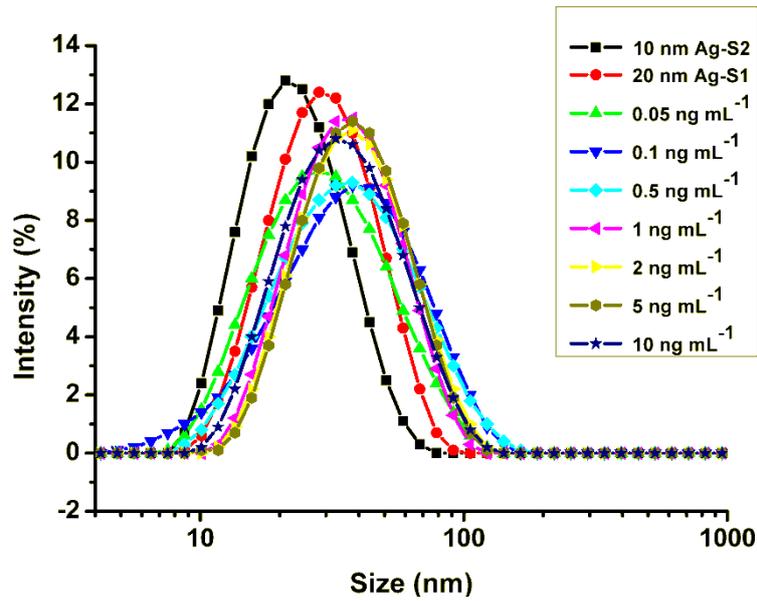
Figure S2. Hydrodynamic diameters of 10 nm AgNPs-S2, 20 nm AgNPs-S1 and asymmetric AgNP dimers



**Figure S3.** The UV signals under different concentrations of  $\text{Pb}^{2+}$  (0, 0.05, 0.1, 0.5, 1, 2, 5 and 10  $\text{ng}\cdot\text{mL}^{-1}$ ), and the mix of 10 nm and 20 nm AgNPs without assembly are shown.



**Figure S4.** Hydrodynamic diameters at different concentrations of  $\text{Pb}^{2+}$  (0.05, 0.1, 0.5, 1, 2, 5 and 10  $\text{ng}\cdot\text{mL}^{-1}$ ).



**Figure S5.** CD spectral change on the determination of  $\text{Pb}^{2+}$  and other metal ions ( $\text{Mn}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Hg}^{2+}$ ,  $\text{Cu}^{2+}$ ) at a concentration of  $5 \text{ ng}\cdot\text{mL}^{-1}$ . The control was of AgNP assemblies excluding metal ions.

