

## Supporting Information

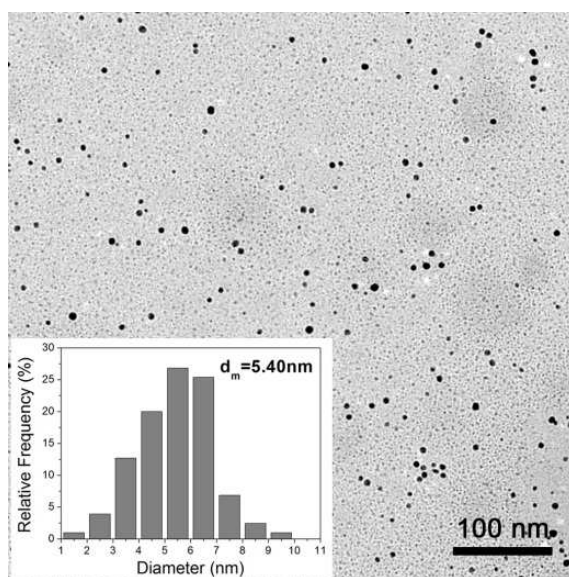
### Green synthesis of gold nanoparticle-nanoclusters composite nanostructures using trypsin as linking and reducing agent

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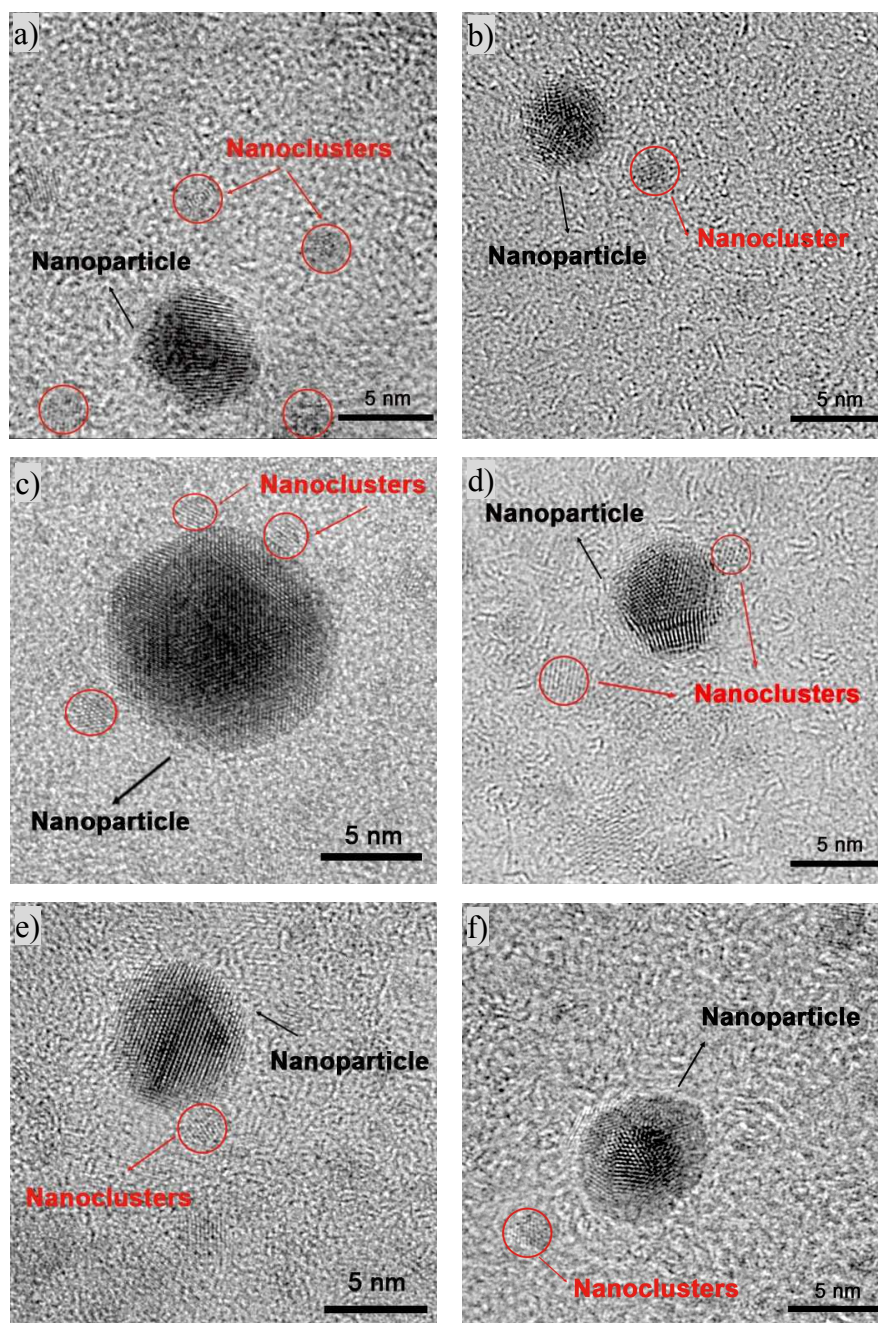
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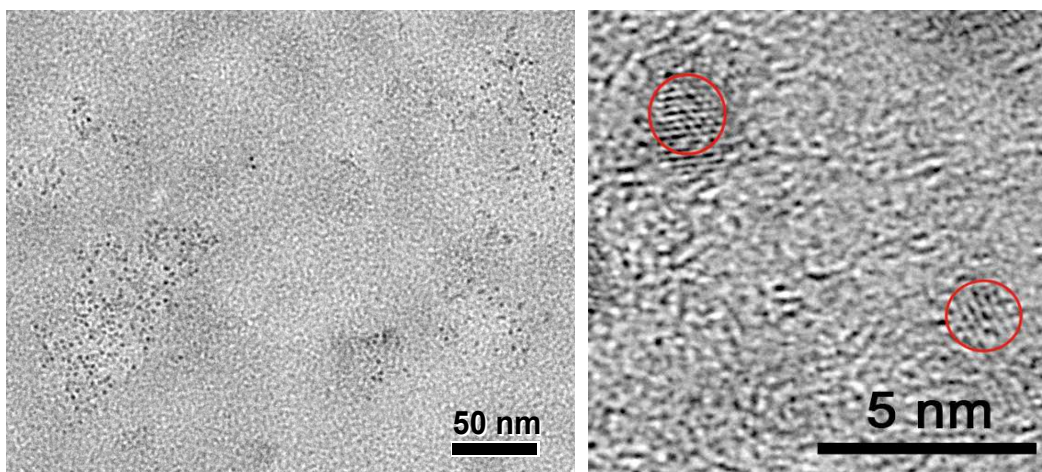
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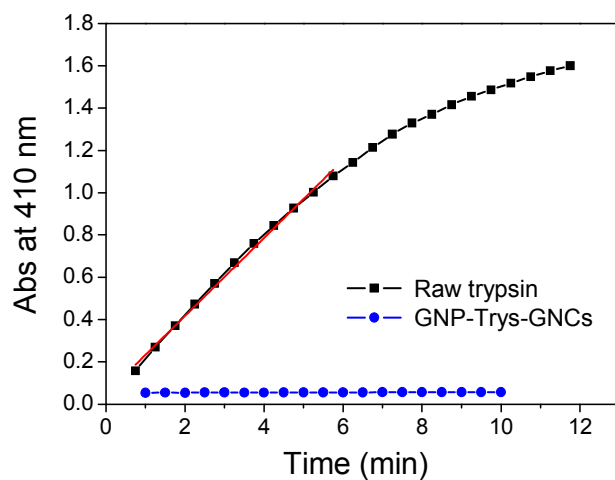
**Figure S1** TEM images of gold composite nanostructures formed at 6 mM  $\text{HAuCl}_4$  concentrations. Other default conditions:  $20 \text{ mg mL}^{-1}$  trypsin, pH 12.0,  $37^\circ\text{C}$ , 6 h. The inset image is the size distribution of GNPs through statical analysis of 200 particles.



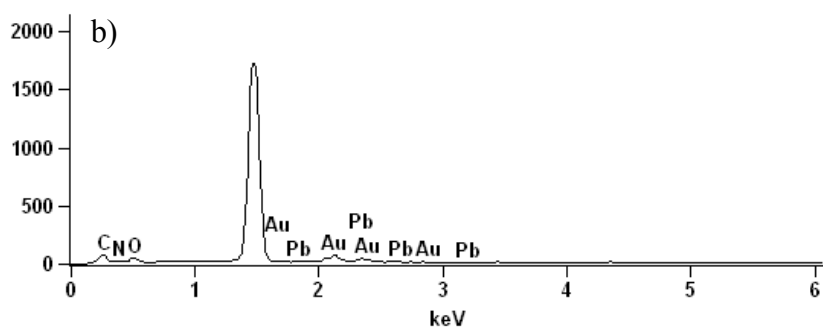
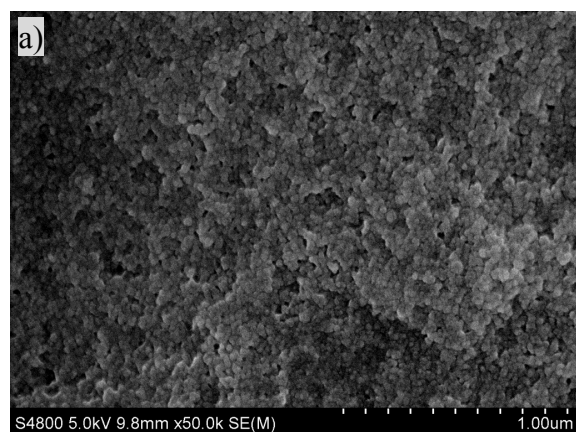
**Figure S2** HRTEM images of gold nanocomposite formed at different  $\text{HAuCl}_4$  concentrations: a-4mM; b, c-6 mM; d-8 mM; e, f-10 mM. Other default conditions unless otherwise noted :  $20 \text{ mg mL}^{-1}$  trypsin, pH 12.0,  $37^\circ\text{C}$ , 6 h.



**Figure S3** TEM and HRTEM image of the second elution peak in SEC chromatogram (Figure 3) which corresponds to the Trys-GNCs.



**Figure S4** UV-Vis analysis of p-nitroaniline from BApNA hydrolysis using raw trypsin(■) or trypsin in gold nanocomposite (●) as catalyst.



**Figure S5** (a) SEM image of the chelation precipitate of GNP-Trys-GNCs nanocomposite and  $\text{Pb}^{2+}$  ions; (b) elemental analysis of the precipitate using SEM-EDX.