

## Supporting Information

### Molecular Patterning and Directed Self-Assembly of Gold Nanoparticles on GaAs

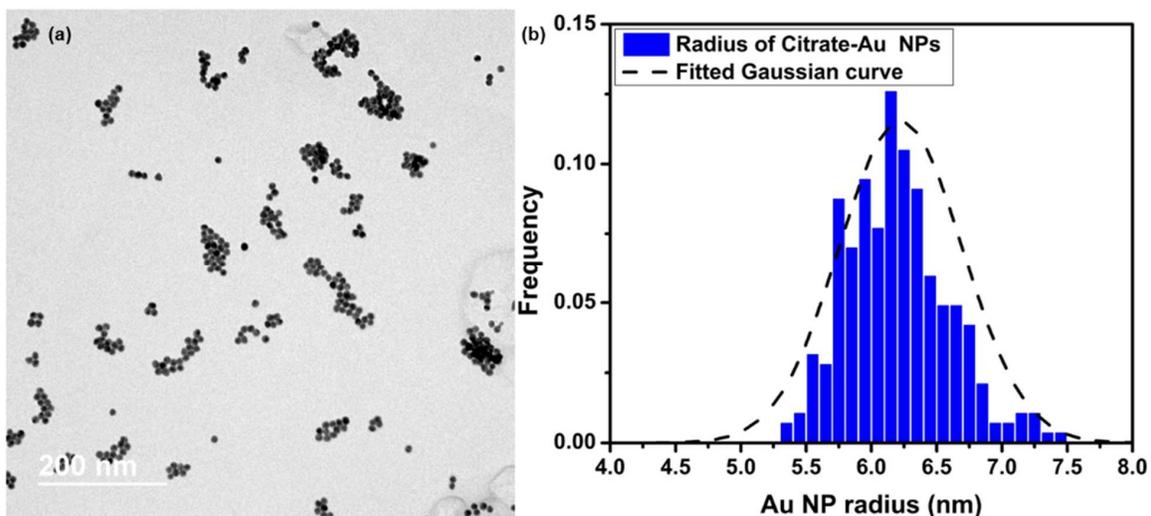
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**Figure S1.** Au NPs and the size distribution. (a) TEM image of citrate Au NPs deposited on a carbon-coated TEM copper grid and (b) their size distribution histogram with fitted Gaussian distribution curve. The average size is  $12.4 \pm 0.5$  nm based on the measurement of 500 Au NPs.<sup>1</sup>

Au NP assembly on Au substrates was performed with a similar procedure as reported.<sup>2</sup> It began with the patterning of ODT molecules on a freshly evaporated Au thin film by  $\mu$ CP with stamp I, followed by the backfill of ATP molecules in the solution for one hour. Finally, the sample was left in Au NP aqueous solution for 24 h. After the assembly, the samples were sonicated in deionized water and dried with nitrogen gas. The AFM and SEM characterizations of the Au NP assembly results are shown in Figure S2.

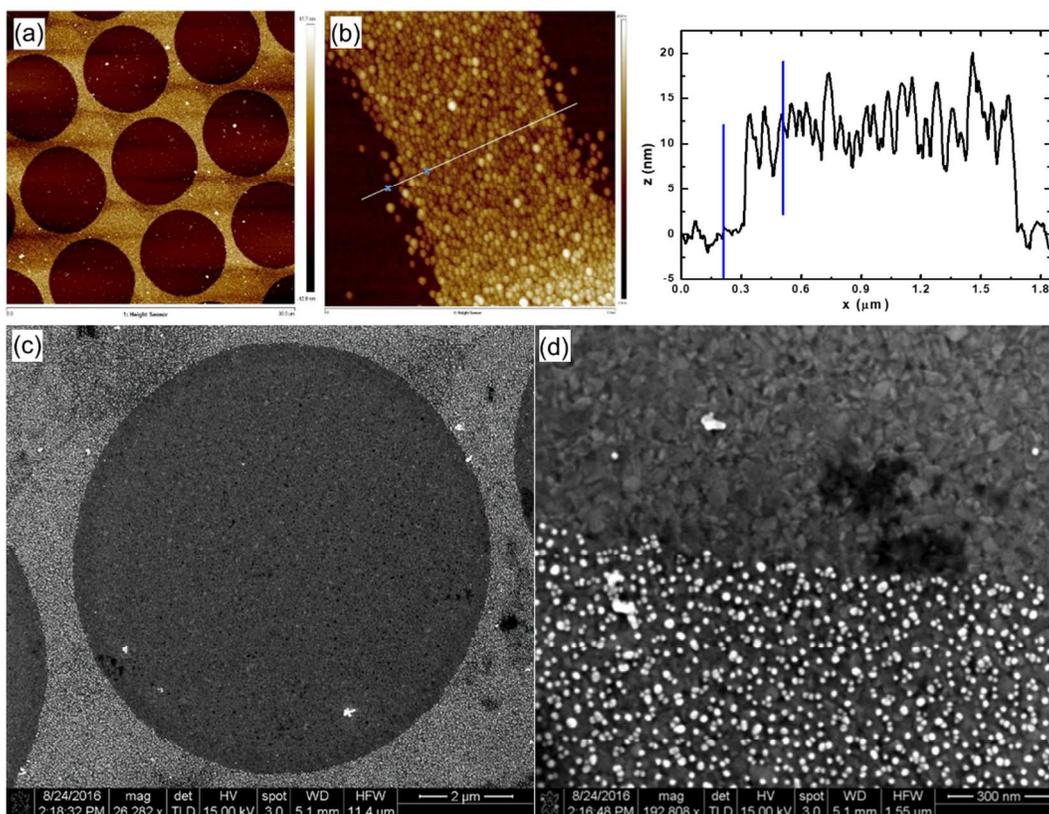


Figure S2. Directed self-assembly of Au NPs on Au substrates. (a) AFM topography image of patterns of assembled Au NPs. (b) Close-up AFM image and the line scan showing a 13 nm height difference. (c) An SEM image of the Au NP assembly. (d) A close-up SEM image showing individual Au NPs.

## Reference

- (1) Yang, G.; Chang, W. S.; Hallinan, D. T. A Convenient Phase Transfer Protocol to Functionalize Gold Nanoparticles with Short Alkylamine Ligands. *J. Colloid Interface Sci.* **2015**, *460*, 164–172.
- (2) Li, B.; Lu, G.; Zhou, X.; Cao, X.; Boey, F.; Zhang, H. Controlled Assembly of Gold Nanoparticles and Graphene Oxide Sheets on Dip Pen Nanolithography-Generated Templates. *Langmuir* **2009**, *25* (18), 10455–10458.