Supplementary Material

Single-step Fabrication of Patterned Gold Film Array by Engineered Multi-functional Peptide

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Peptide Synthesis: Multi-functional peptides QBP-AuBP, AuBP-QBP, QBP and AuBP sequences were synthesized on Wang resin *via* automated Fmoc peptide synthesis and HBTU activation using CSBio 336s peptide synthesizer (CSBio Inc, USA). The synthesized resin-bound peptides were cleaved and side deprotected by Reagent K (TFA/thioanisole/H_2O, phenol/ethanedithiol – 82.5:5:5:5:2.5) and then precipitated in cold ether. The obtained crude peptides were then purified by reversed-phase high-performance liquid chromatography (HPLC system, Waters, USA) using Gemini column (10 μm C18 110A) (AnalSpec, USA). The mass of purifies peptides were checked by mass spectroscopy using matrix-assisted laser desorption/ionization (MALDI) mass spectrometer with time-of-flight detector (TOF).

Figure S1. Peptide Synthesis and Characterization. Table of synthesized peptide sequences and their respective molecular weights (a), MALDI-TOF MS spectrums of synthesized and HPLC purified peptide sequences (b).

a

Peptide	*Sequence*	*MW (expected)*	*MW (detected)*
AuBP	WAGAKRLVLRRE	1454.7	1456.2
QBP	PPPWLPYMPPWS	1467.7	1469.2
QBP-AuBP	PPPWLPYMPPWS-GGG-WAGAKRLVLRRE	3075.6	3074.7
AuBP-QBP	WAGAKRLVLRRE-GGG-PPPWLPYMPPWS	3075.6	3074.4

b

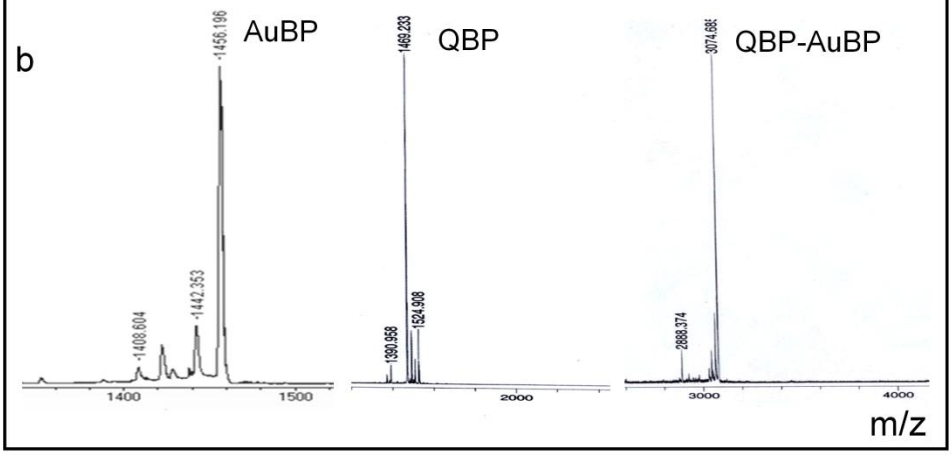

Figure S2. Production of Gold Nanoparticle Arrays *via* Peptide-mediated Immobilization. Schematic of peptide-mediated immobilization of Au NP array (a), dark field images of gold nanoparticle arrays (b), respective images from atomic force microscopy along with height profiles (c).

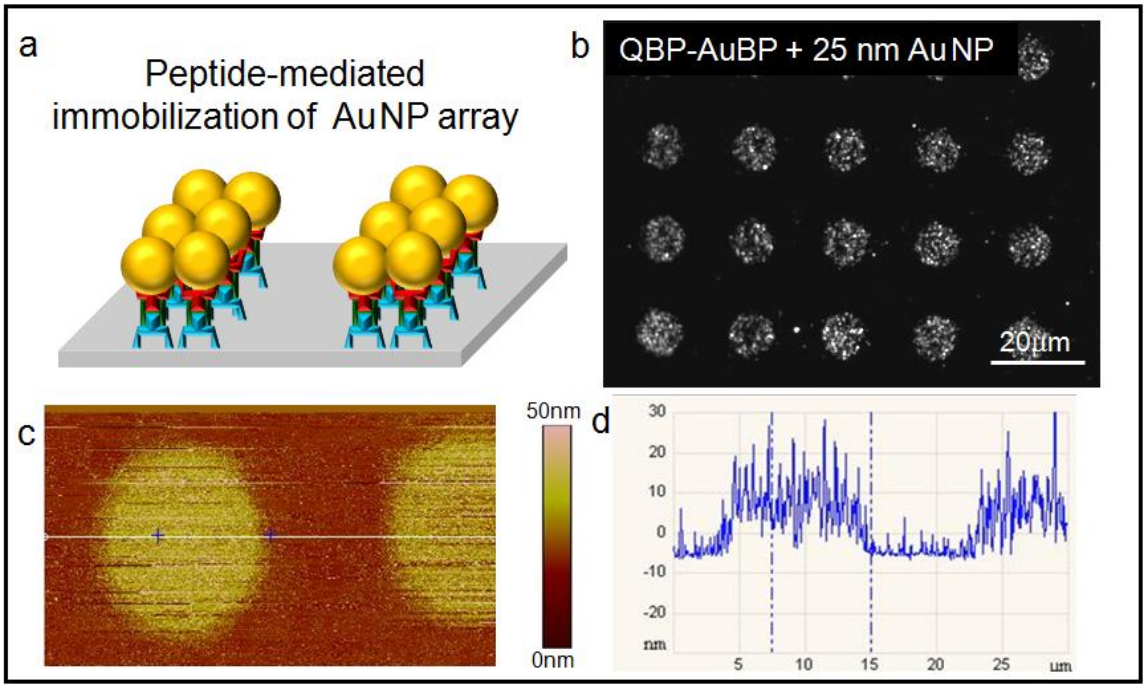

Figure S3. Fabrication of Gold Nanoparticle Film Arrays *via* Peptide-mediated Gold Formation. Atomic force microscopy images along with height profiles of formed gold film *via* peptide-mediated gold formation at different zooms (a-b).

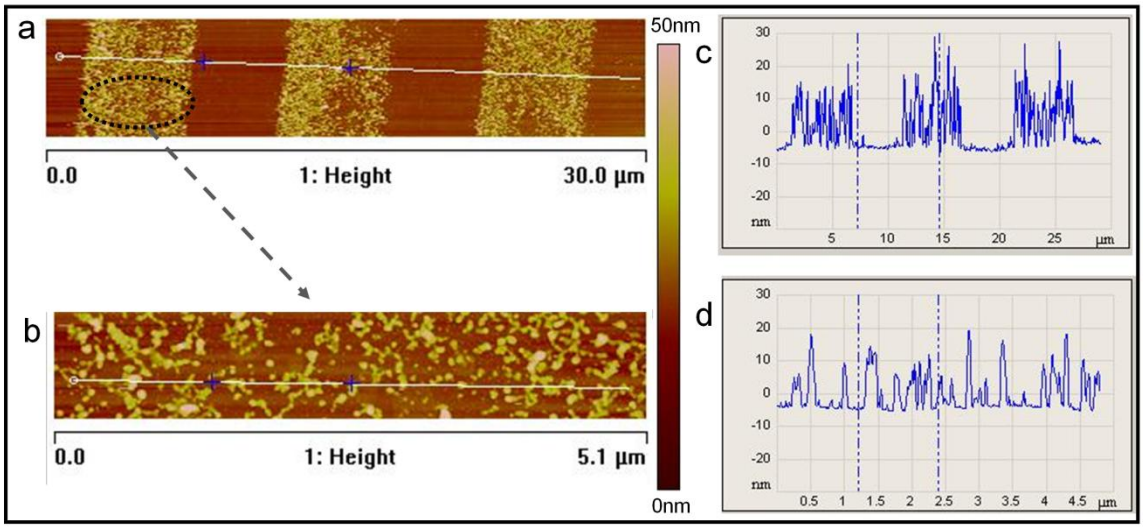

Figure S4. Fabrication of Gold Film Arrays *via* Peptide-mediated Gold Formation. Atomic force microscopy images along with height profiles of control experiment (no peptide printed) at different zooms (a-b).

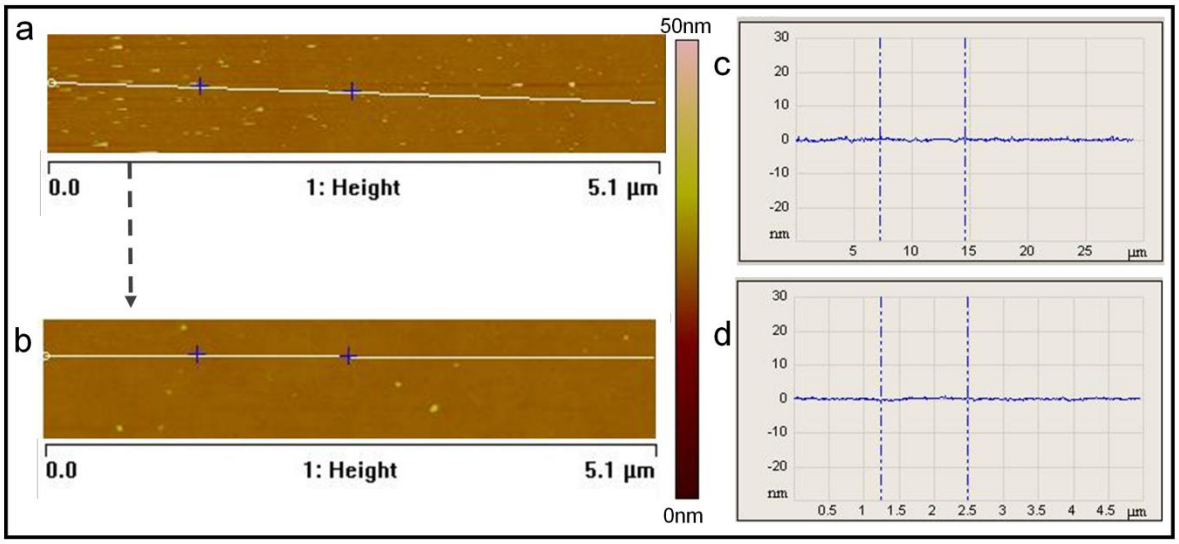

Figure S5. Fabrication of Gold Film Arrays *via* Peptide-mediated Gold Formation. X-ray photoelectron spectroscopy Au4f (a) and C1s (b) scans obtained from gold nanoparticle film formed *via* peptide-mediated gold formation (blue) and from control samples with no peptide present (red).

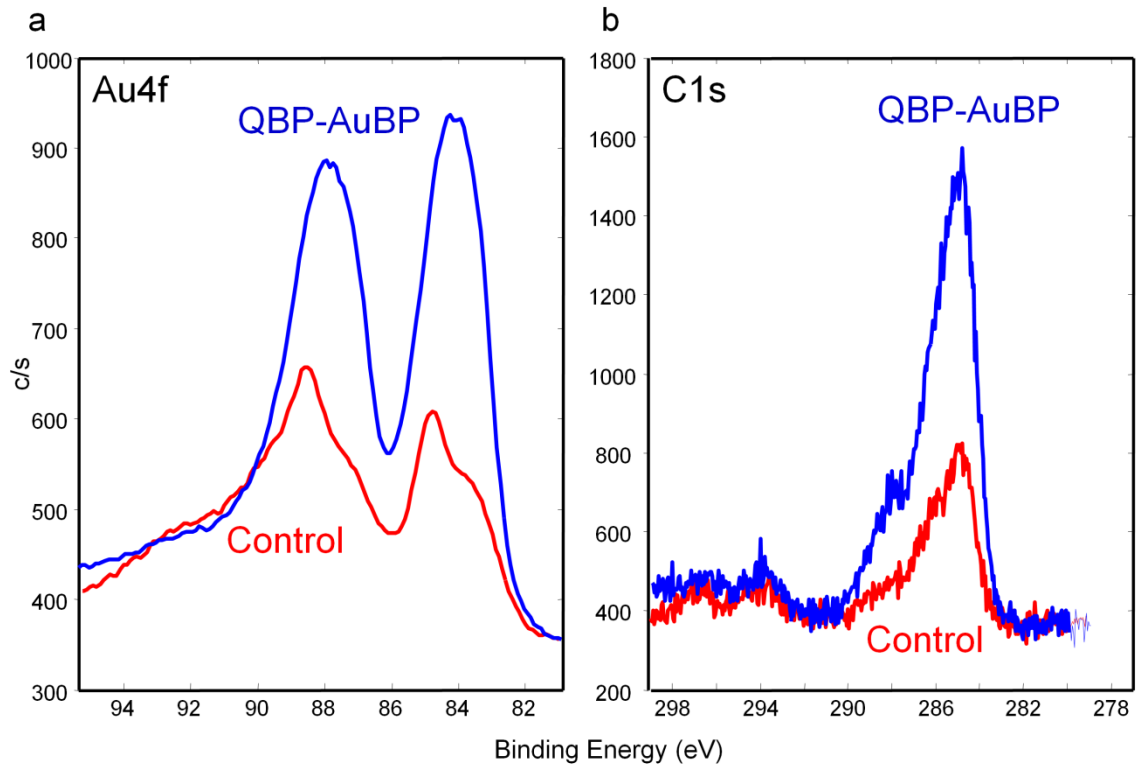

Figure S6. Fabrication of Gold Film Arrays *via* Peptide-mediated Gold Formation.

Scanning electron microscopy images of produced gold nanoparticle film on silica surface *via* peptide-mediated gold formation at different zooms (a-d), sample surface was prior to SEM coated with thin layer of Pt.