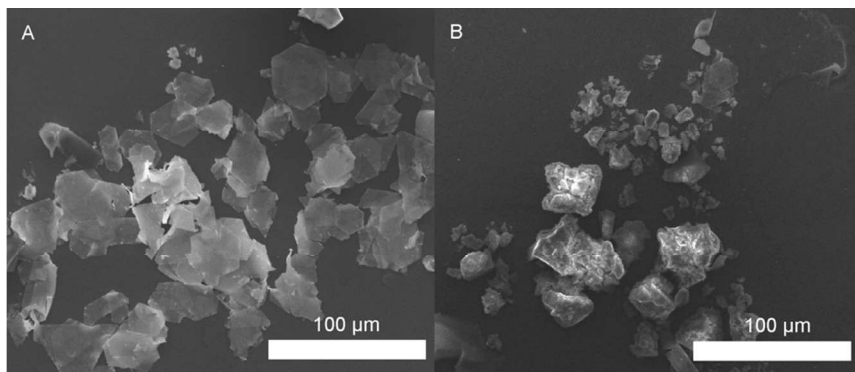


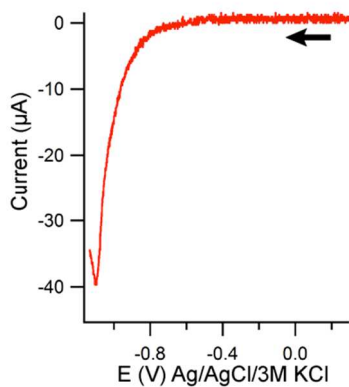
# Nanoscale chemical patterns on gold microplates

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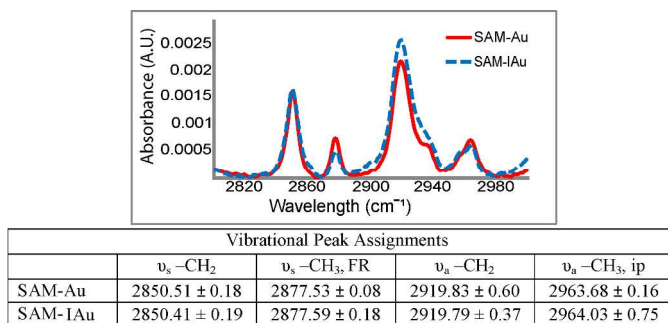
## Supporting Information



S 1 Representative SEM images of gold structures from an Au microplate growth solution drop-casted onto ITO. The reaction in the solution was allowed to proceed for 10 hrs.

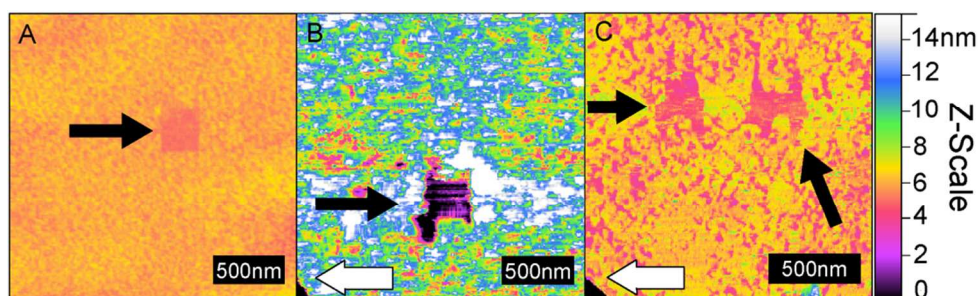


S 2 Extended range linear sweep voltammogram of an ODT SAM-IAu working electrode under 0.50 M KOH. Sweep rate was 100 mV/sec.



S 3 IR spectra of ODT SAM formed on Au film (—) and IAu (---).

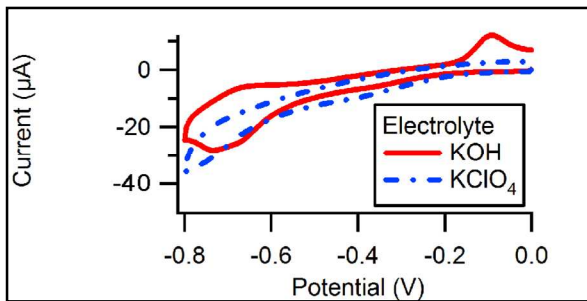
Figure S4B shows an AFM image of an Au microplate that had been treated with UV/Ozone for 20 minutes at 120°C, rinsed with water then ethanol before the formation of the ODT SAM. The surface was rough with numerous defects (rms roughness = 2.6 nm). In addition, the depth of the nanoshaved area is 8 nm, suggesting that the treatment leads to the formation of a gold oxide layer, which may be difficult to remove by simple rinsing. Although additional treatment may remove the gold oxide layer, a concern remains that the underlying gold surface will be roughened. Milder UV-Ozone treatment (shorter exposure and lower temperature) did not effectively remove the iodine adlayer as indicated by incomplete SAM formation. We also prepared an ODT SAM by first subjecting the AMI substrate to room temperature piranha solution for 30 minutes (Figure S4C). The approximately 2 nm deep defects suggest that a small amount of iodine remains on the microplate and impedes the formation of a complete monolayer. The depth of the shaved area is identical to the depth of the SAM defect, confirming the presence of a monolayer covering most of the surface. Although a prolonged treatment with piranha solution may eventually lead to a complete removal of the iodine adlayer, we found that the surface conductivity of the ITO substrate was lost after more than 30 minutes of piranha treatment due to the dissolution of ITO in an acidic solution.



S 4 Contact mode AFM images in ethanol of a SAM prepared onto an Au microplate.

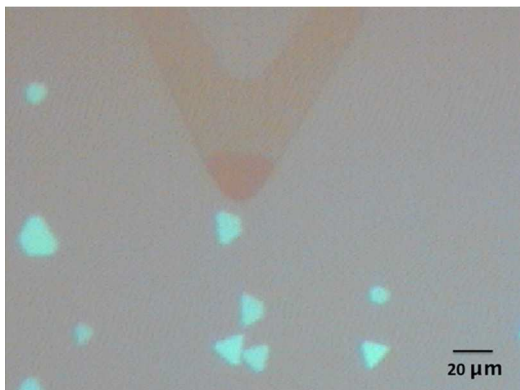
Before we attempt to form a SAM, the AMI substrate is pretreated with (A) ethanol

rinsing, (B) UV/Ozone irradiation, and (C) piranha solution immersion. All nanoshaved regions, indicated with black arrows, are 250 nm squares and shown near the Au microplate's edge (B,C), white arrows.

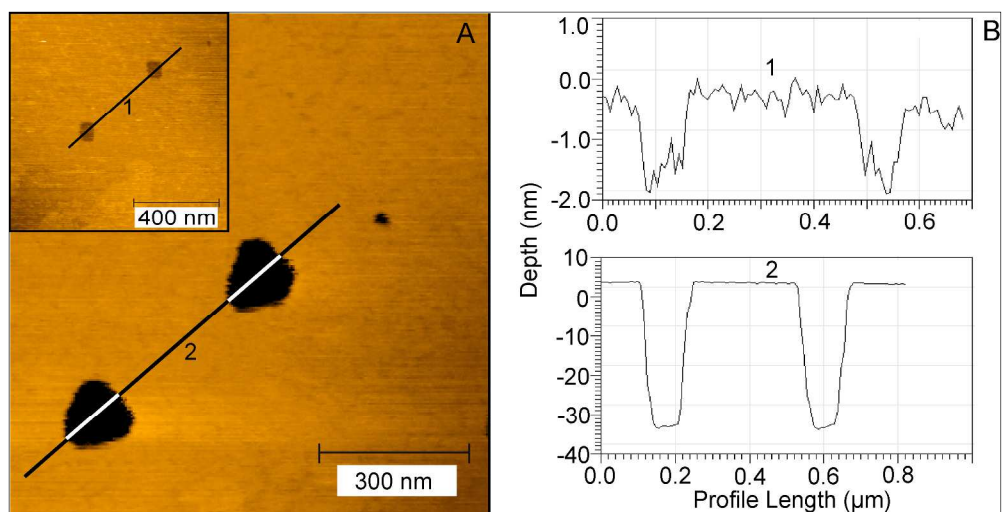


S 5 CV of Bare Au film under 0.50 M KOH ( — ) and 0.10 M  $\text{KClO}_4$  ( - - ) electrolyte.

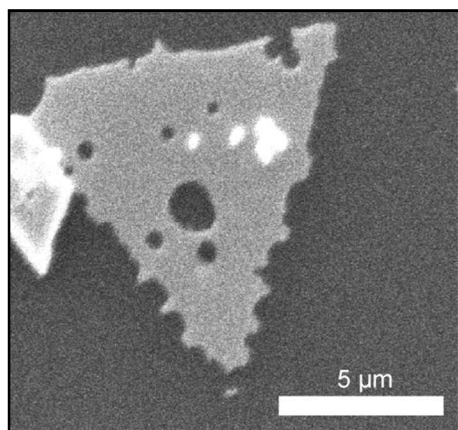
Sweep rate was 100 mV/sec.



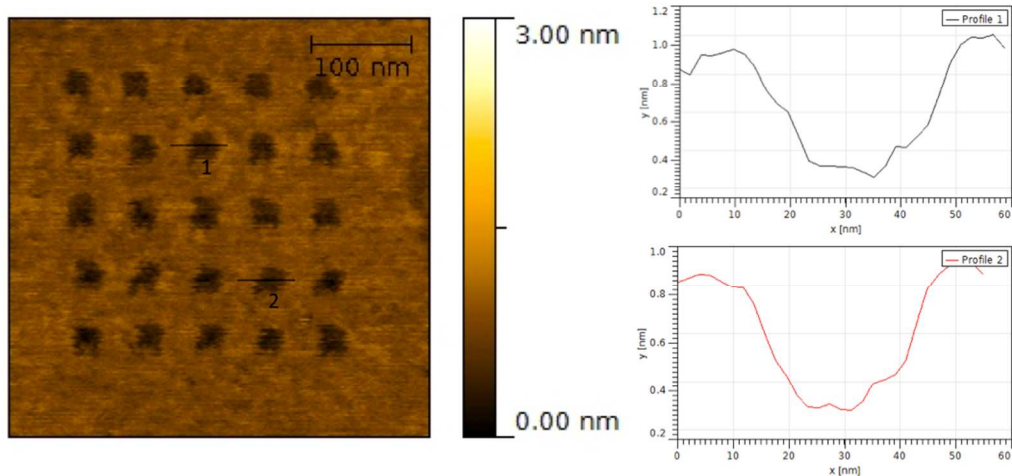
S 6 Optical viewfinder image of microplates on ITO under an AFM cantilever. The AFM probe can be positioned directly on a specific microplate to perform nanolithography and imaging.



S 7 (A) ODT SAM etch resist formed on a Au microplate followed by nanoshaving small squares (inset) to expose the gold surface to excessive etching using oxygenated thiourea. (B) Numbered height profiles (1, 2) corresponding to numbered lines drawn over AFM topography images in (A). Note the absence of etching away from the nanoshaved areas.



S 8 SEM image of an etched Au microplate with an ODT SAM formed on a piranha treated AMI substrate at room temperature. Removal of the SAM under piranha at room temperature for one minute is undertaken for SEM sample preparation. Au microplates etched by piranha are negligible under these conditions.



S 9 AFM image of nanografted pattern of 11-Mercapto-1-undecanol in ODT SAM on AMI. The cross sectional profiles on the right show that the nanografted areas are  $0.6 \pm 0.1$  nm deep.