Supporting Information

Evaluation of 3D gold nanodendrite layers obtained by templated galvanic displacement reactions for SERS sensing and heterogeneous catalysis

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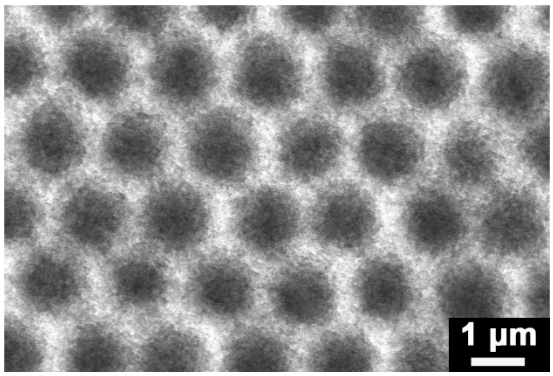
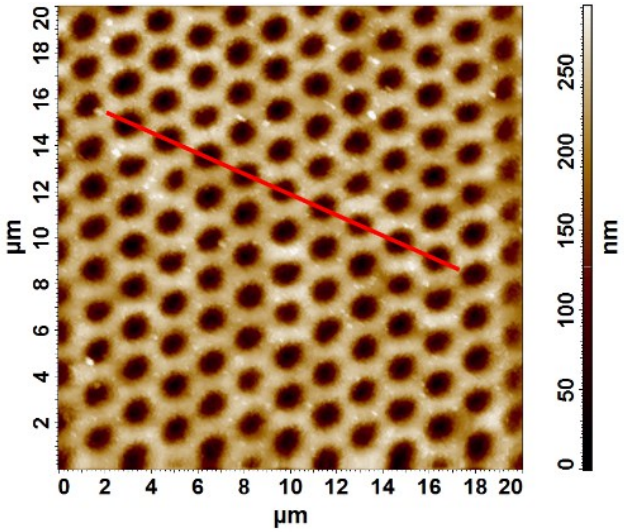


a)



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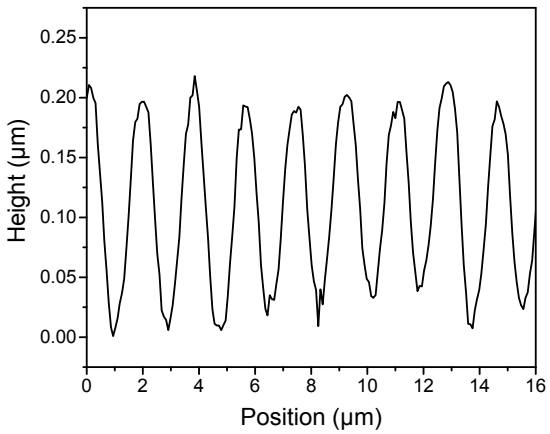


c)

Figure S1. a) SEM and b) AFM images of tpSi. c) Topographic AFM line profile along the red line in panel b) revealing that the depth of the tpSi indentations amounts to ~200 nm.

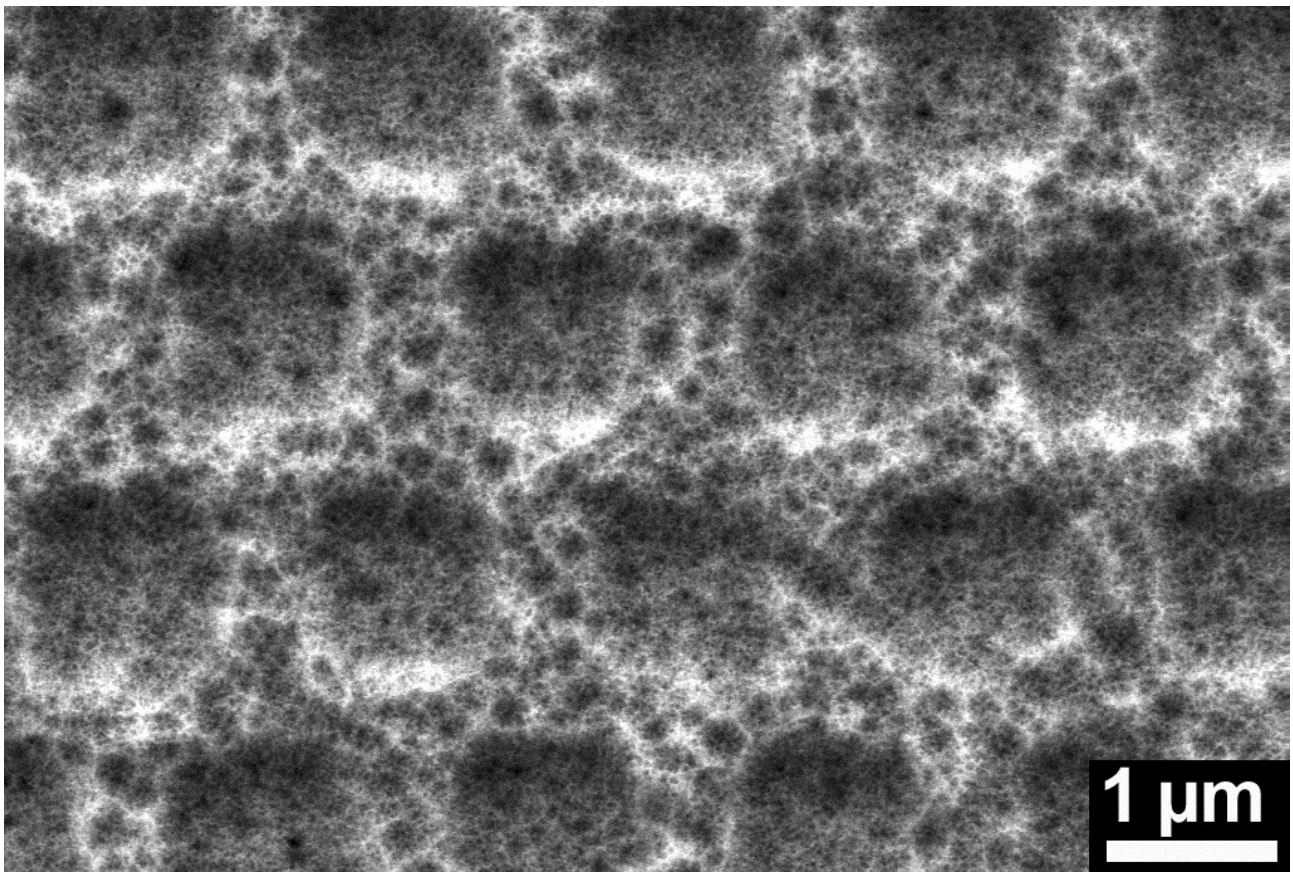
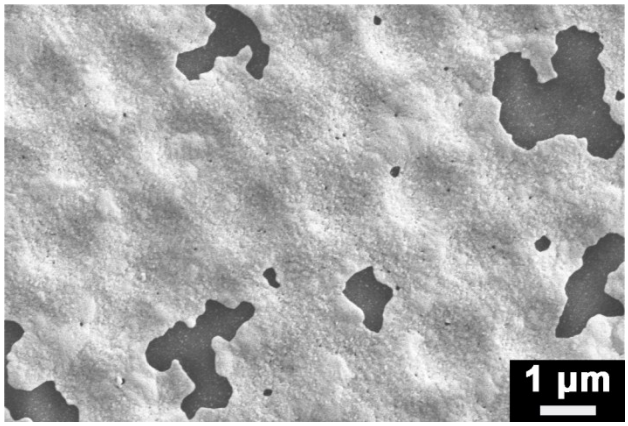
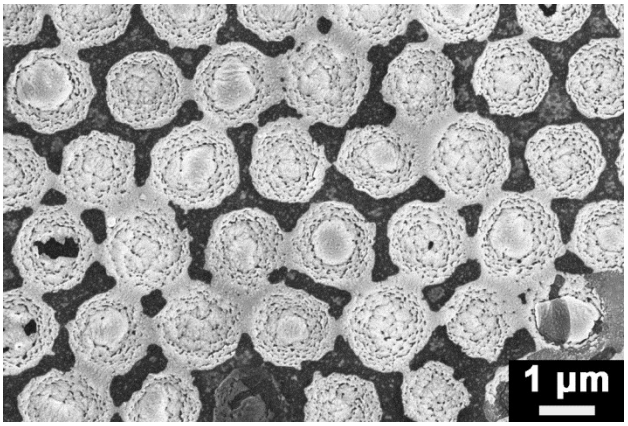


Figure S2. High-resolution SEM image of tpSi obtained by the procedures reported by Han et al.[1], showing the hierarchical macro/mesoporous surface topography of tpSi.



a)



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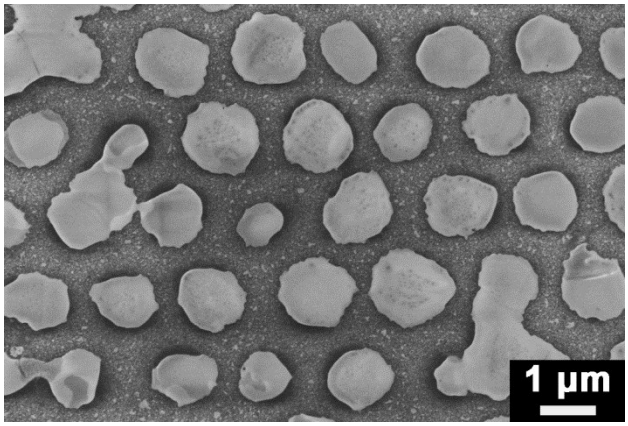


c)

Figure S3. SEM images of tpSi coated with a 35 nm thick gold film after annealing for 2 h at a) 400 °C, b) 500 °C and c) 600 °C.

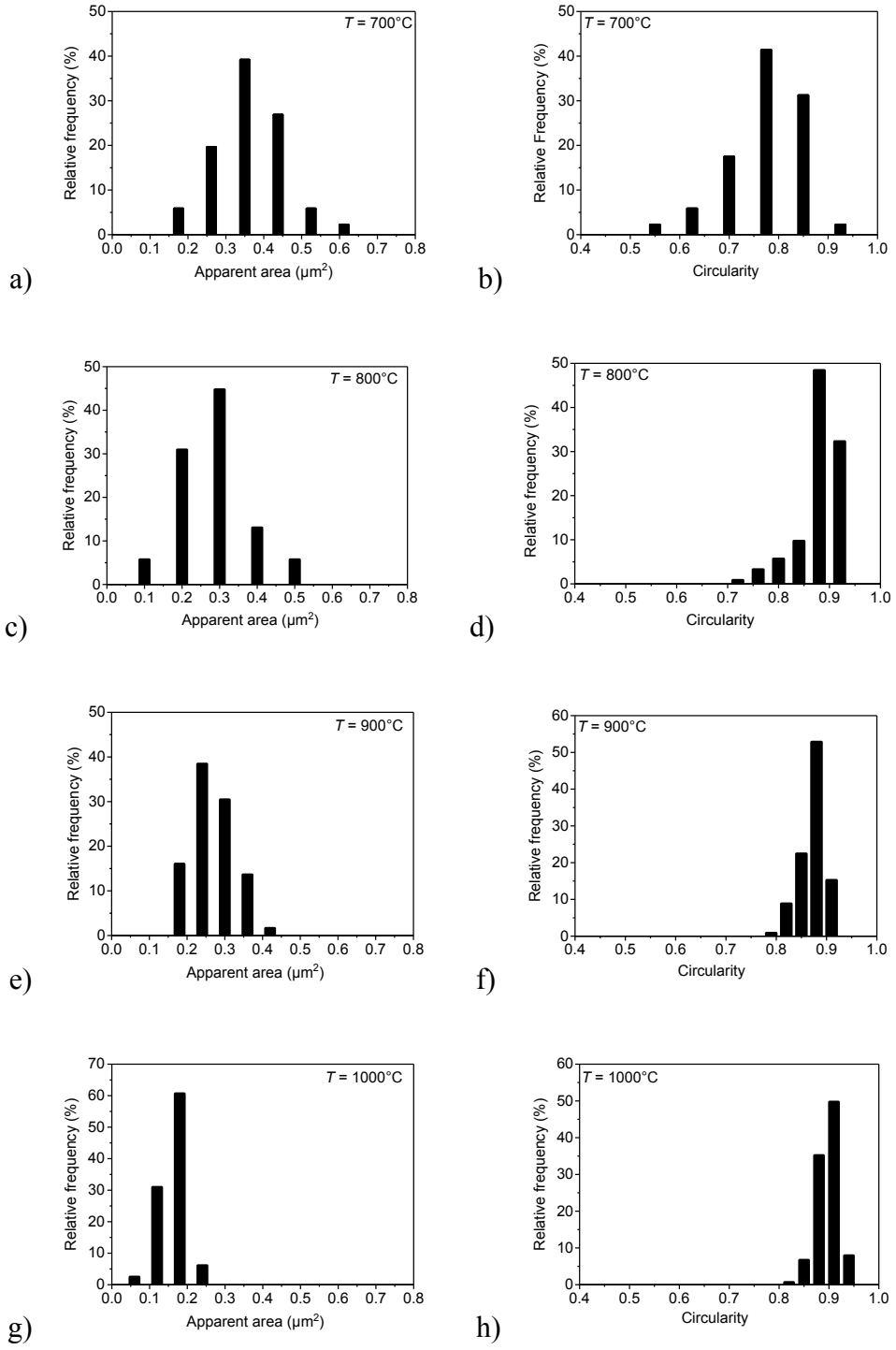


Figure S4. Relative frequencies of the apparent areas (a, c, e, g) and the circularities (b, d, f, h) of Au particles obtained by annealing tpSi coated with a 35 nm thick gold layer for 2 h at a), b) 700°C, c), d) 800°C, e), f) 900°C and g), h) 1000°C. The relative frequencies were obtained by the analysis of SEM images. For an annealing temperature of 700°C (panels a and b) 135 Au particles were evaluated, for an annealing temperature of 800°C (panels c and d) 123 Au particles, for an annealing temperature of 900°C (panels e and f) 125 Au particles and for an annealing temperature of 1000°C (panels g and h) 165 Au particles.

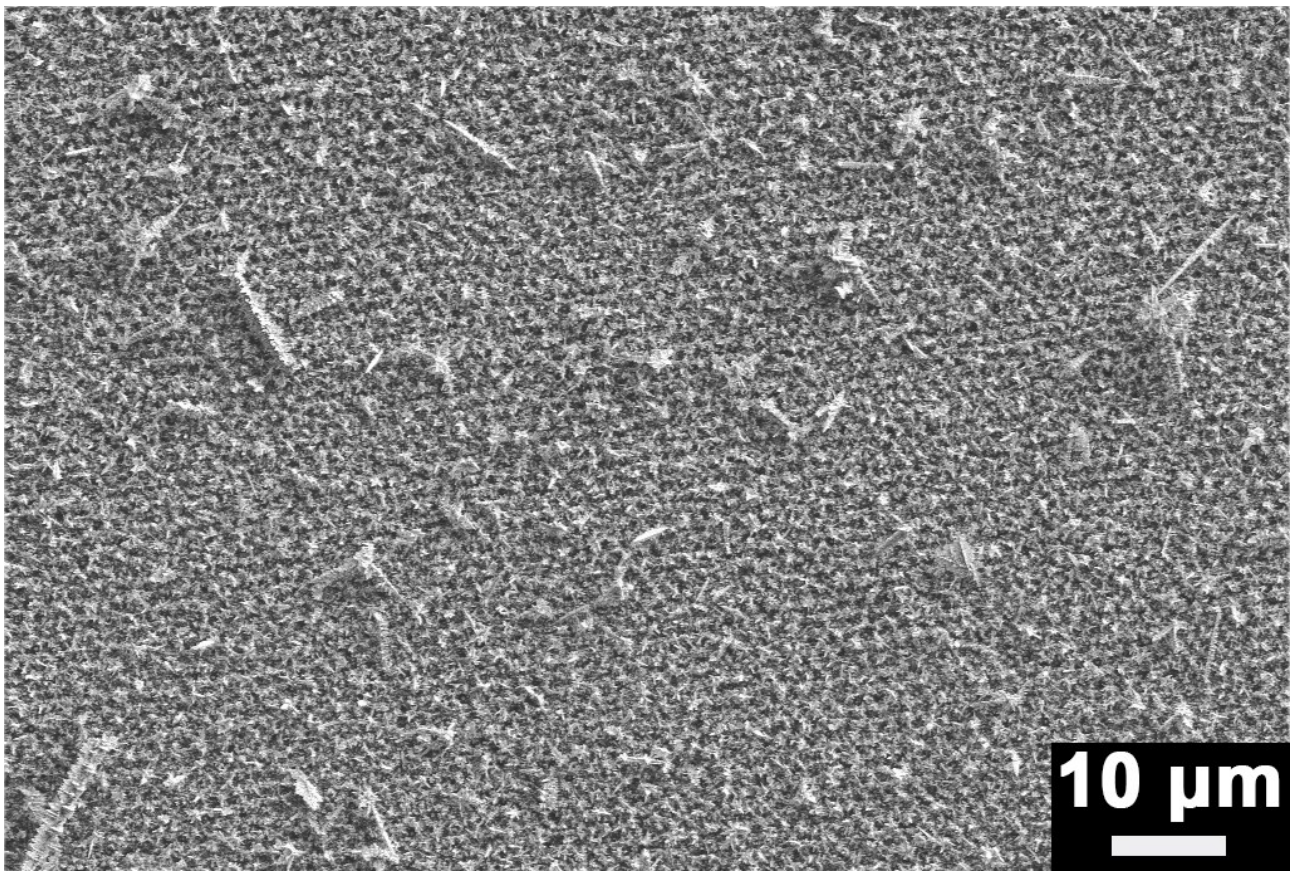


Figure S5. Large-field SEM image of a dense layer of 3D gold nanodendrites on tpSi obtained by solid state dewetting at 900 °C for 2 h and 10 min GDR.

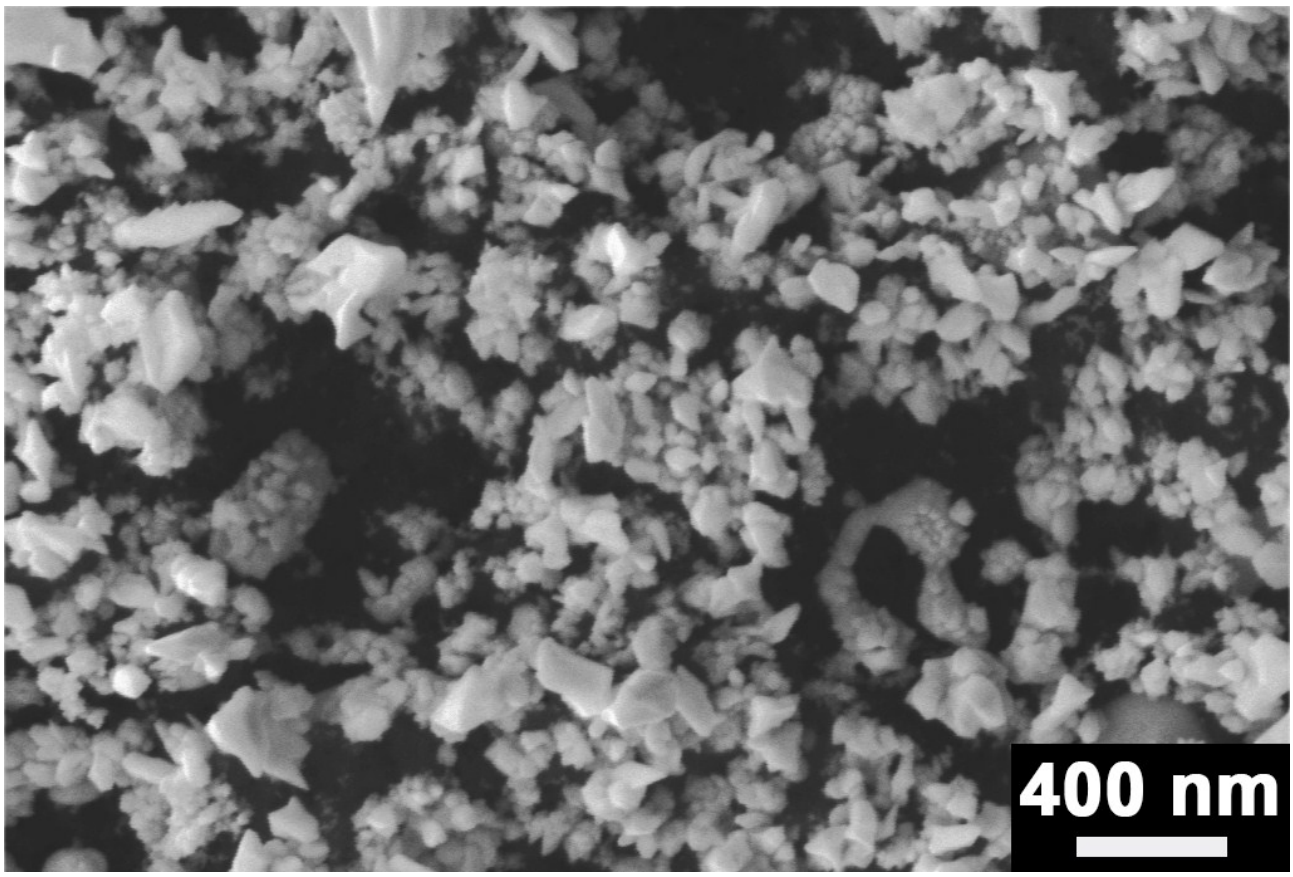


Figure S6. SEM image of tpSi coated with a ~35 nm thick Au film after GDR for 10 min referred to "tpSi + Au" in Figure 5 of the main manuscript.

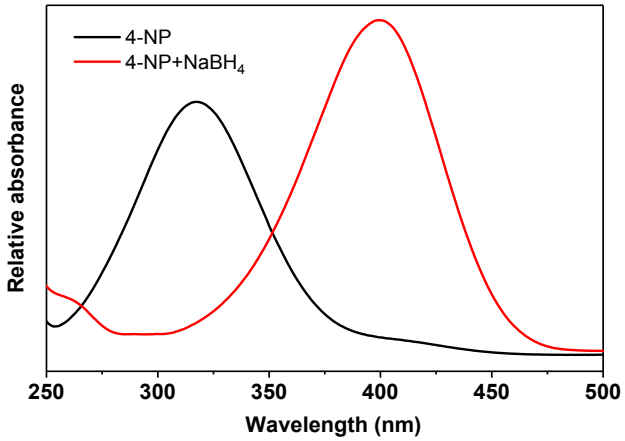
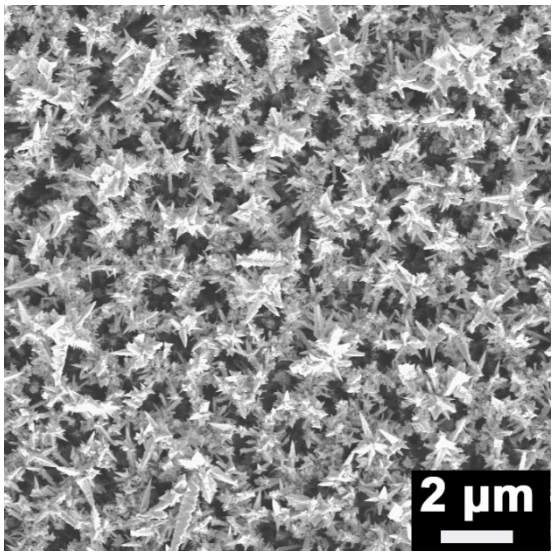


Figure S7. UV-vis absorption spectra of 4-NP (1.33 mL, 0.1 mmol/L) and 0.67 mL deionized water prior to (black curve with an absorption band at 317 nm) and after addition of 1 mL 0.1 mol/L aqueous $NaBH_4$ solution (red curve with an absorption band at 400 nm).

a)



b)

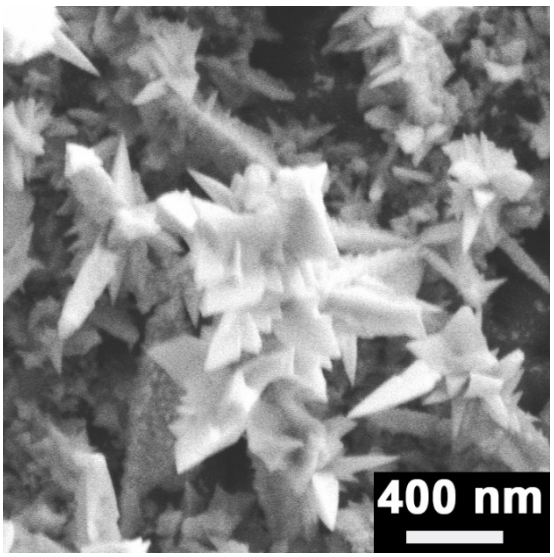
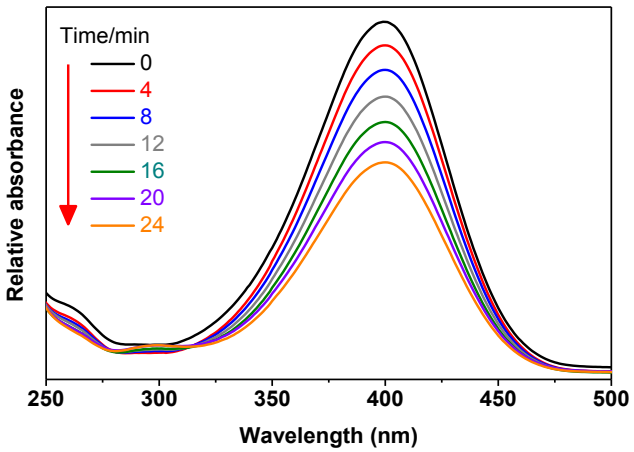
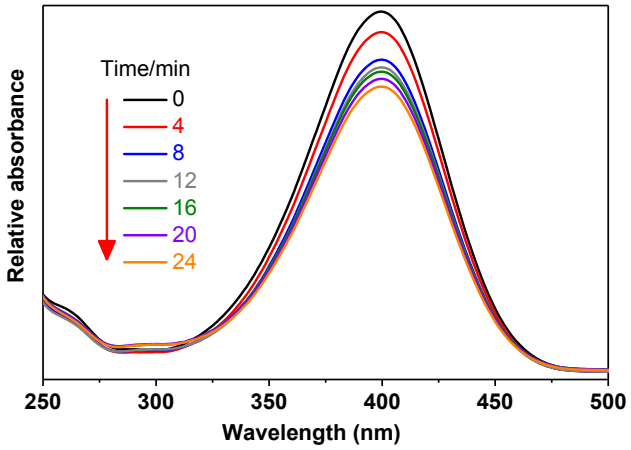


Figure S8. SEM images of 3D gold nanodendrite layers on tpSi obtained by solid state dewetting at 900 °C for 2 h followed by GDR for 10 min after use in the catalytic reduction of 4-NP. a) Large-field view; b) detail.



a)



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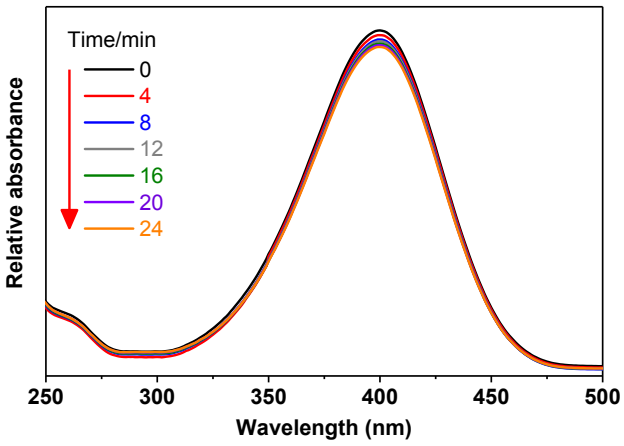

c)

Figure S9. Series of UV-vis absorption spectra showing the absorption band of 4-NP in the presence of $NaBH_4$ at 400 nm for different reaction times. The reduction of 4-NP was carried out a) in the presence of gold-coated tpSi subjected to a GDR for 10 min without solid-state dewetting by annealing ("tpSi + Au"), b) in the presence of a smooth Si wafer covered with a 35 nm thick gold film, and c) in the presence Au particles on tpSi obtained by to solid-state dewetting for 2 h at 900° without GDR.

Reference

1. W. Han, P. Hou, S. Sadaf, H. Schäfer, L. Walder and M. Steinhart, *ACS Appl. Mater. Interfaces*, 2018, **10**, 7451-7458.