Electronic Supplementary Material (ESI) for CrystEngComm.

Supplementary Information

Growth of Gold Nanostructures on Si Wafer by Concerted Mechanisms of Photoreduction and Galvanic Displacement

Tetsuro Soejima,* Yukihiro Katayama, and Sohei Fujii

Department of Applied Chemistry, Faculty of Science and Engineering, Kindai University, 3-4-1 Kowakae, Higashi-osaka, Osaka 577-8502, Japan.

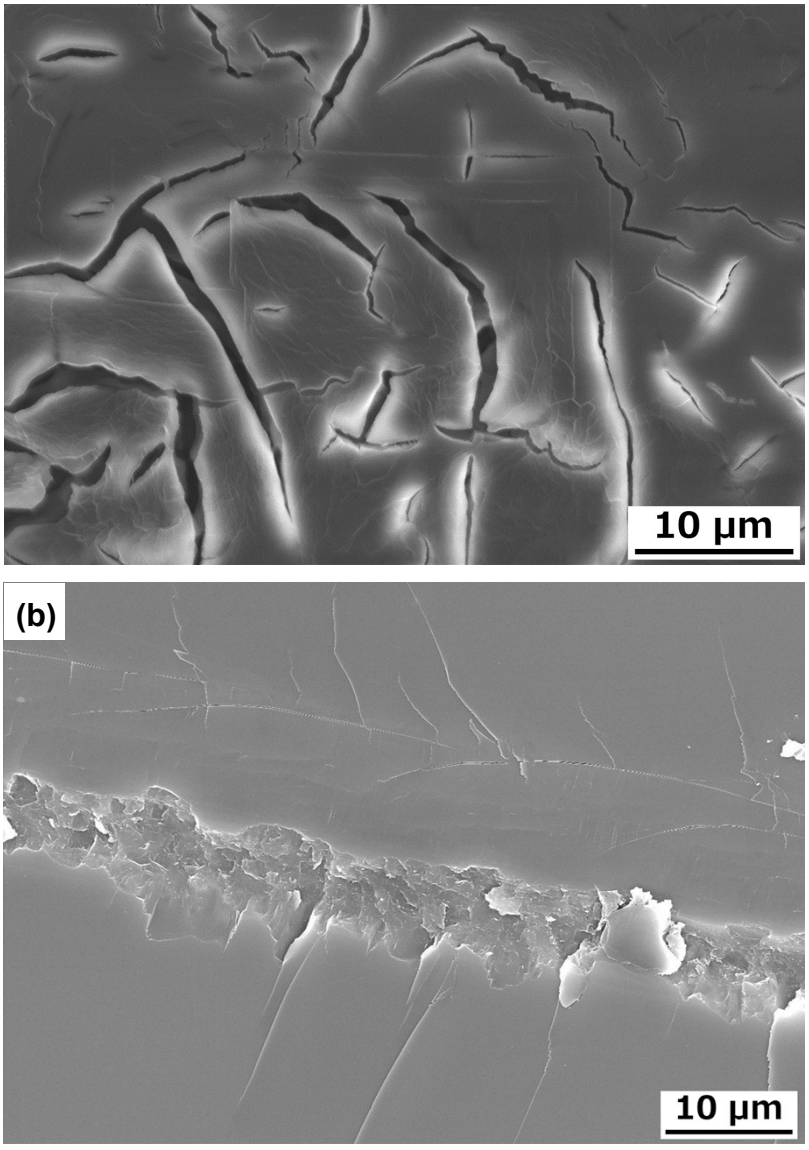


Fig. S1 SEM images of CTAB covered Si wafer (a) and a Si wafer which is manually scratched using a pen-type diamond glass cutter (b).

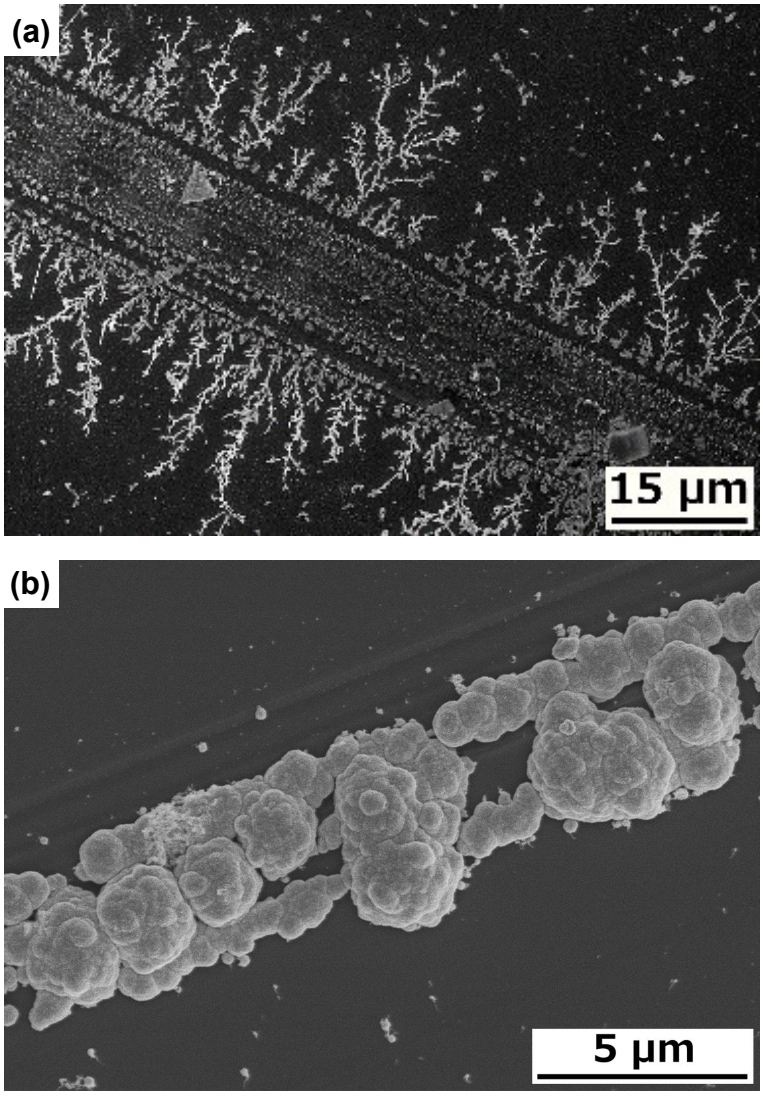
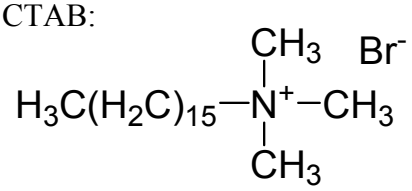
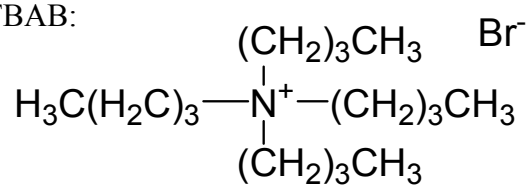


Fig. S2 SEM images of gold nanostructures formed after photoirradiation of scratched Si wafers in $Au(OH)_4^-$ aqueous solution with (a) and without (b) CTAB film.

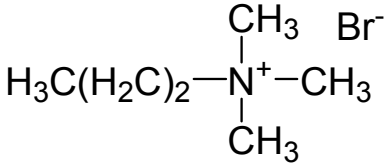
CTAB:



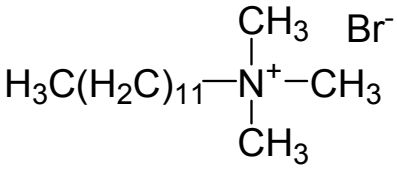
TBAB:



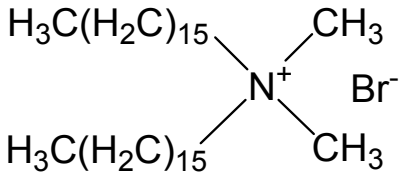
PTAB:



DTAB:



DHTAB:



CTAC:

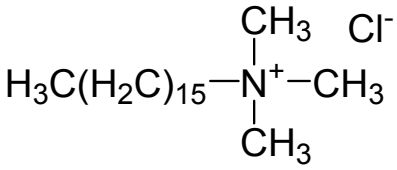


Fig. S3 Chemical structures of organic salts which were used in the manuscript.

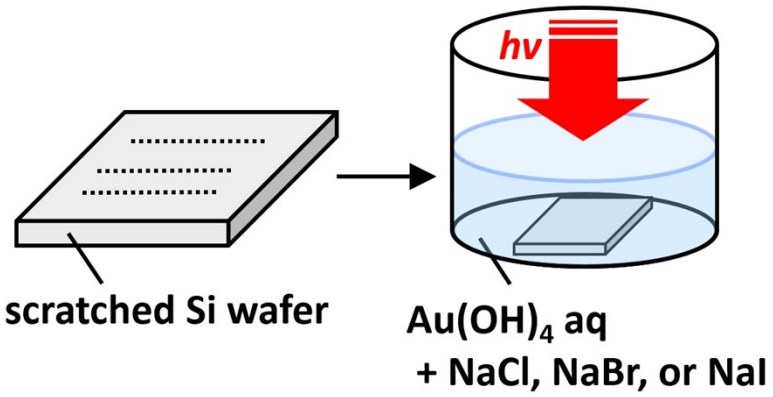


Fig. S4 A schematic illustration of the experimental procedure. NaCl, NaBr, or NaI was dissolved in $Au(OH)_4^-$ aqueous solution (molar ratio; halogen anion:Au^{3+} ion = 4:1). Si wafers which were scratched by a pen type diamond glass cutter were placed in the $Au(OH)_4^-$ aqueous solution containing sodium halide. The immersed wafers were photoirradiated perpendicularly in the $Au(OH)_4^-$ aqueous solution.

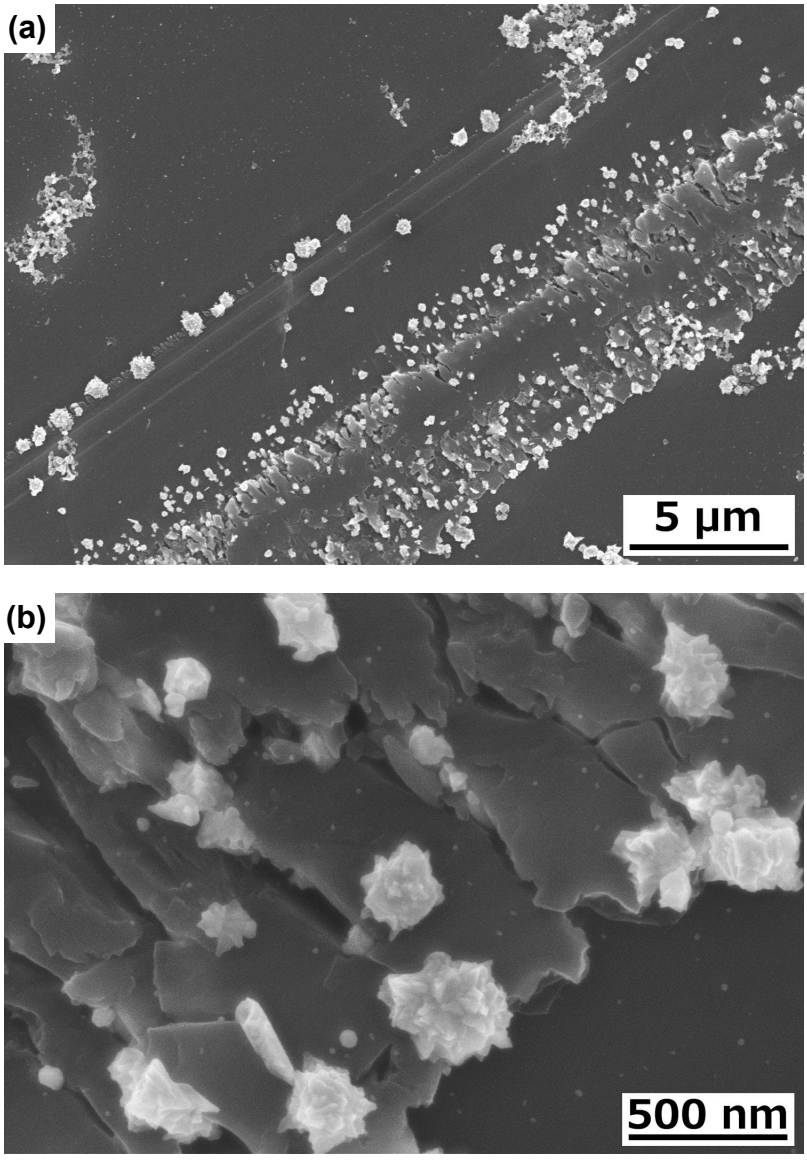


Fig. S5 Low (a) and high (b) magnification SEM images of CTAB/scratched Si wafer after immersion in $Au(OH)_4^-$ aqueous solution without photoirradiation for 24 h. Gold nanocrystals preferentially deposited at the scratched portions.

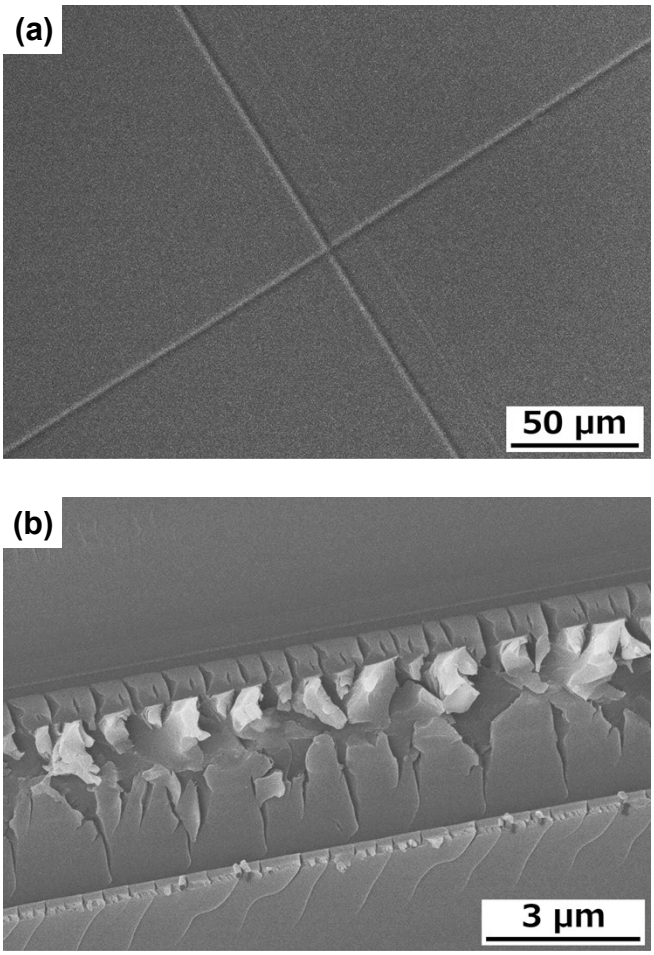


Fig. S6 Low (a) and high (b) magnification SEM images of scratched glass film after photoirradiation in $Au(OH)_4^-$ aqueous solution for 30 min. The glass film was pre-covered with CTAB.

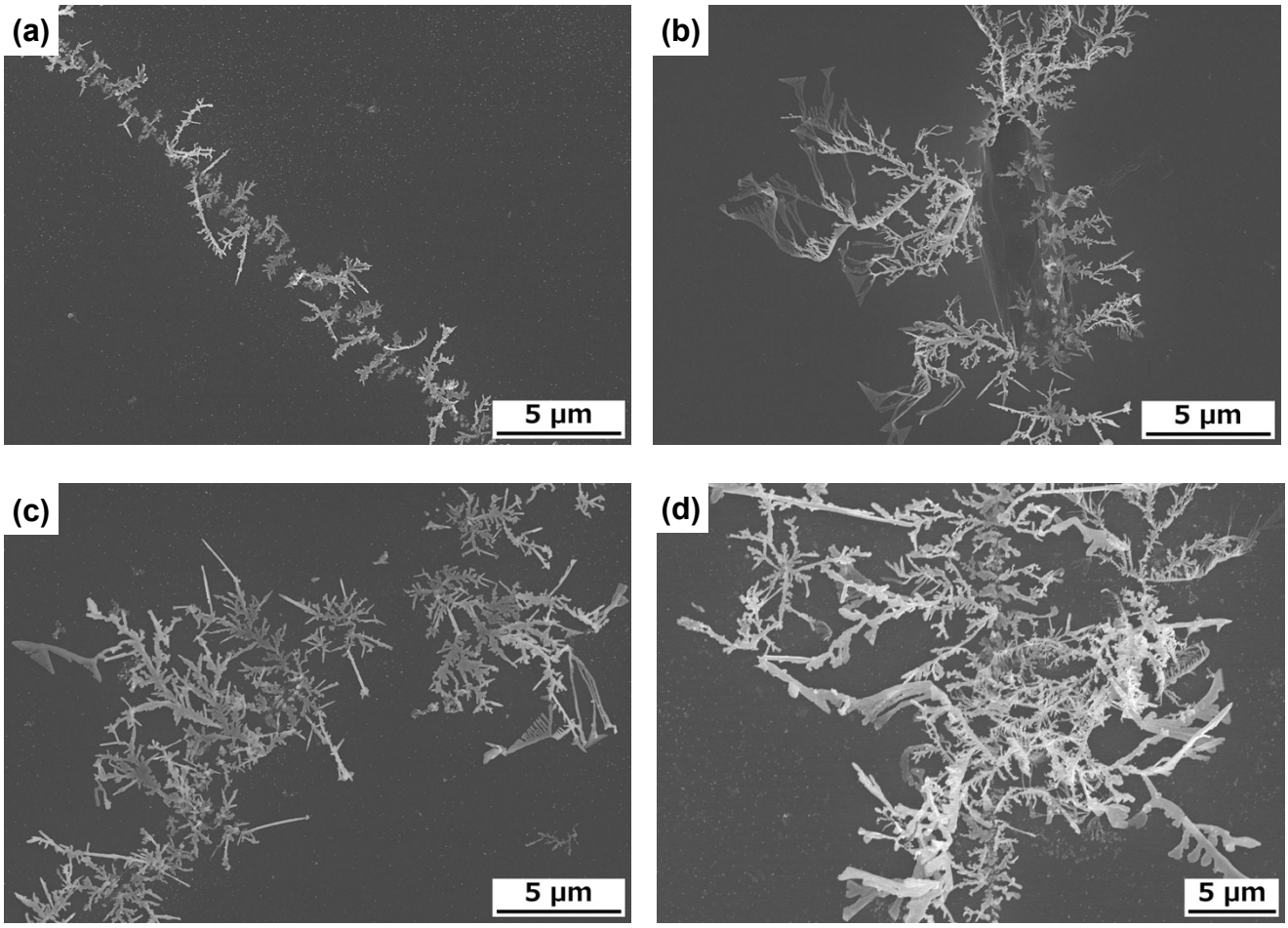


Fig. S7 SEM images of dendritic gold nanostructures obtained at different photoirradiation periods: (a) 5 min, (b) 10 min, (c) 20 min, (d) 30 min.

Table S1. Concentration of Si ions in alkaline aqueous solution. Si wafer.

Condition	Si conc. (ppm)
NaOH aqueous solution (pH 10)	2.01
$Au(OH)_4^-$ aqueous solution (pH 10)	4.79