Supporting information

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1. Characterization of Ag nanostructure fabricated on the substrate

The elemental map of Ag nanowire and point analysis of Ag nanoplates fabricated on the recyclable-photosensitizer-coordinated Si-wafer (substrate **I)** are shown in Figure S1 and S2, respectively. As can be clearly deduced from the mapping and point analysis, those nanostructures are composed of Ag.

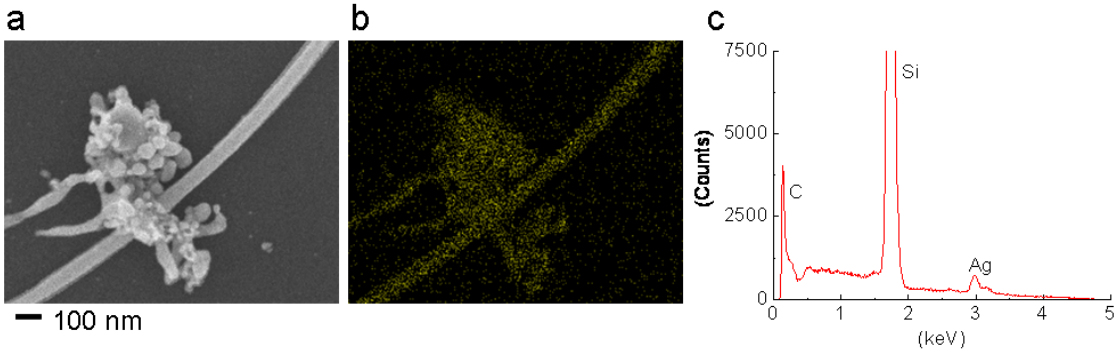


Figure S1. Characterization of nanowire. Scanning electron microscopy (SEM) image (a), the corresponding energy dispersive X-ray spectrometry (EDS) elemental mapping of Ag (b) and the EDS spectrum (c).

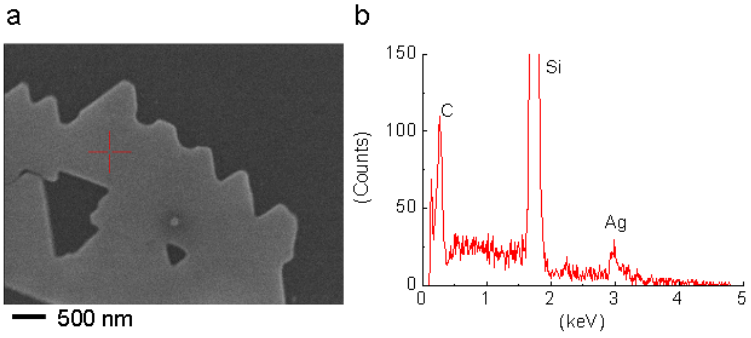


Figure S2. Point analysis of nanoplate fabricated on organic surface. The SEM image (a) and the EDS spectrum (b).

3. SEM image of substrate I after the single UV irradiation for 2 hours

The SEM image of Ag nanostructure fabricated on substrate **I** after the single UV laser irradiation for 2 h in aqueous alcoholic solution (ε_{mix} = 68 and 32) of $AgNO_3$ (1 mM). In the polar solution (ε_{mix} = 68), short nanowires were observed after the laser irradiation (Figure S3). The density of nanowire was low and the length of wires is short compared with those observed after the two-laser beams irradiation. In the less-polar solution (ε_{mix} = 32), nanoparticles or aggregates sparsely dispersed on the substrate were observed after the single UV laser irradiation (Figure S4).

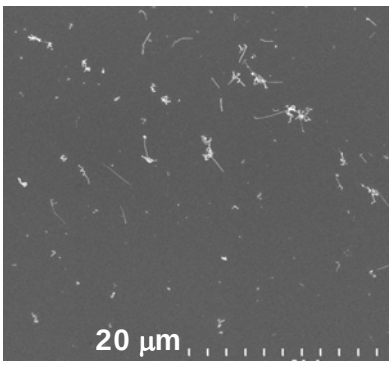


Figure S3. SEM image of Ag nanostructure fabricated on the substrate **I** after the single UV laser irradiation for 2 h in polar solution (ε_{mix} = 68) of $AgNO_3$ (1 mM).

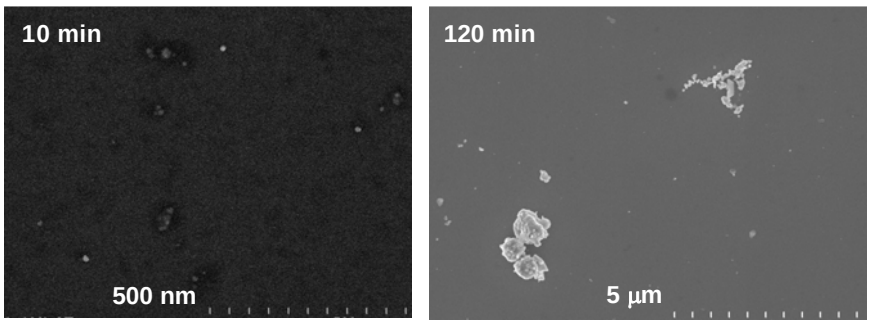


Figure S4. SEM image of Ag nanostructure fabricated on the substrate **I** after the single UV laser irradiation for 10 min and 2 h in aqueous alcoholic solution (ε_{mix} = 32) of $AgNO_3$ (1 mM).

4. Low magnification SEM image of Ag nanoplate

The low magnification SEM image of Ag nanoplates fabricated on the surface of substrate **I** is shown in Figure S2. In less-polar solution, the most nanostructures generated on the surface are the nanoplate.

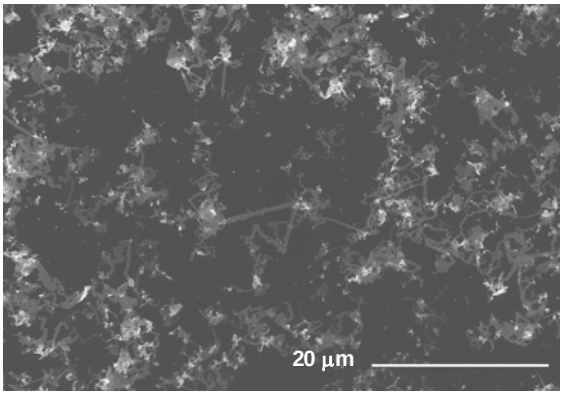
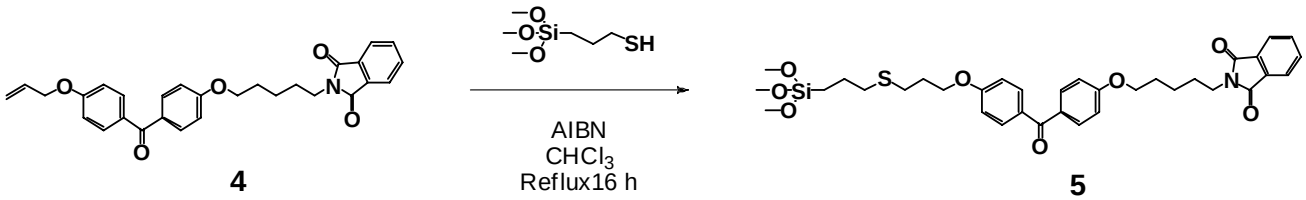


Figure S5. Low magnification SEM image of Ag nanoplates fabricated in the surface of substrate **I**.

5. Coupling reaction between compound 4 and (3-mercaptopropyl)trimethoxysilane



4 **5**

3-Mercaptopropyl)trimethoxysilane (MPTMS) (5 mmol) and 2,2'-azobis(2-methylpropionitrile) (AIBN) (1.22 mmol) were dissolved in Ar-purged dry toluene (20 ml).[1] After **4** (0.5 mmol) was added, the solution was diluted with $CHCl_3$ (20 ml). The reaction mixture was refluxed for 16 h under Ar atmosphere. The solvent was evaporated in vacuo and the crude product was exhaustively washed with hexane (1.2 l) to remove any unreacted excess MPTMS. The product was dried under reduced pressure to give **5** (FW 665.87, 270 mg, 0.4 mmol, 80%). ^{1}H-NMR($CDCl_3$), d 7.86-7.70 (8H), 6.95 (4H), 4.15 (2H), 4.04 (2H), 3.73 (2H), 3.57 (9H), 2.72 (2H), 2.57 (2H), 2.10 (2H), 1.87 (2H), 1.73 (2H), 1.55 (2H), 1.24 (2H), 0.76 (2H).

4. Atomic force microscopy (AFM) image of Si wafer and organic surface

The AFM image of Si wafer and organic surface were shown in Figure S6. AFM imagings were carried out on a SPI 3800N (Seiko Instruments). After the coordination of organic surface, the averaged roughness of surface (R_a) is increased, while it is still within 0.5 nm.

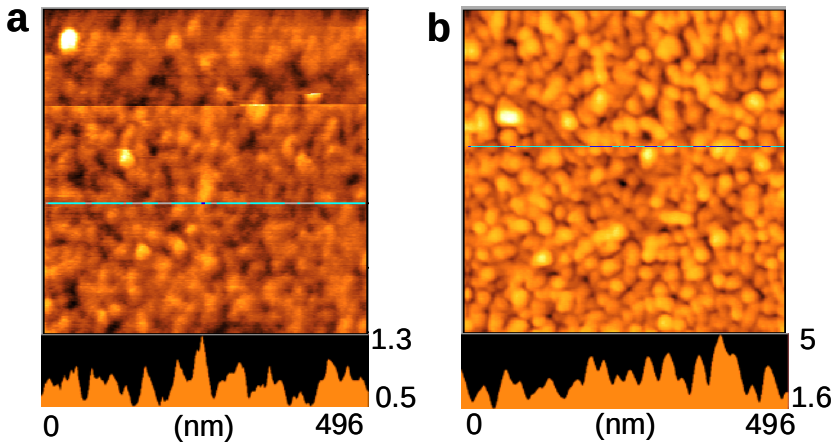


Figure S6. AFM image of washed Si wafer (a) and organic surface (b) (500 × 500 nm). Cross-section views are also shown.

5. Measurement of contact angle

The contact angle (θ) was measured by observing cross-section of small droplet of solutions on the substrate (Table 1). To avoid the deformation under its own weight, the volume of droplet were limited to less than 2 μl. Since the Si wafer surface is hydrophilic, the θ value of water droplet on the surface is less than 5°. By coordinating the organic compound on the surface, the θ value significantly increased to 48°. The θ values were decreased with decreasing solvent polarity.

Table 1. Contact angle of water, 2-propanol, and their mixtures on the substrate **I** and **II**

ε_{mix}	80	68	32	20
Substrate **I**	48°	28 ± 2°	5° <[a]	5° <[a]
Substrate **II**	50°	32°	5° <[a]	5° <[a]

[a] The determination of θ value was impossible.

Reference

(1) M. Álvaro, M. Benítez, J. F. Cabeza, H. García, and A. Leyva, *J. Phys. Chem. C* 2007, **111**, 7532.