

Electronic Supplementary Material

Self-assembled monolayer modulated Plateau-Rayleigh instability and enhanced chemical stability of silver nanowire for invisibly patterned, stable transparent electrodes

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Supporting Figures

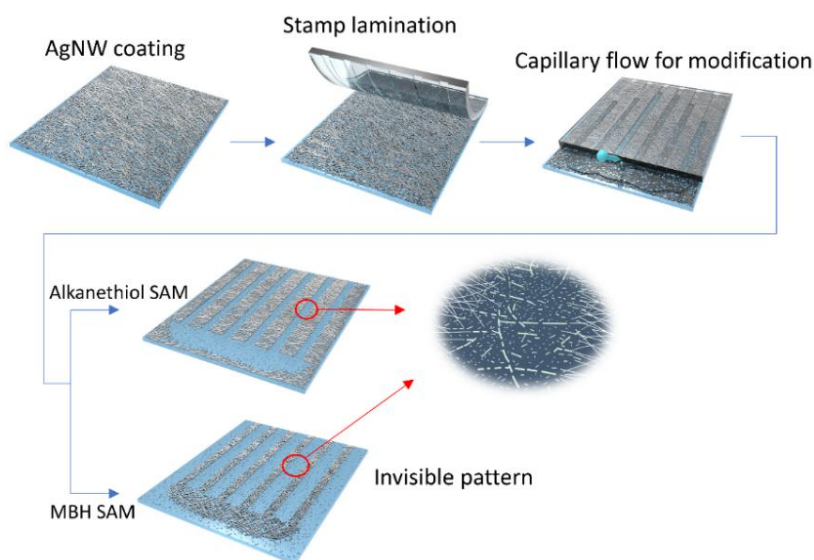


Figure S1. Schematic illustration of the selective modification with stamp-induced capillary flow.

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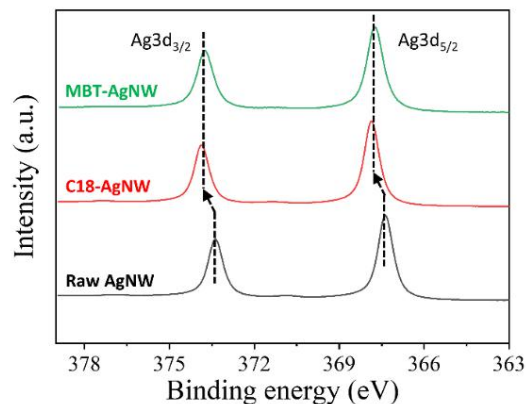


Figure S2. High-resolution XPS spectra of Ag3d for raw AgNWs, C18-AgNWs, and MBT-AgNWs. The binding energy of Ag3d_{3/2} shifts from 373.38 eV to 373.88 eV after C18 modification and 373.78 eV after MBT modification. The binding energy of Ag3d_{5/2} shifts from 367.38 eV to 367.88 eV after C18 modification and 367.73 eV after MBT modification.

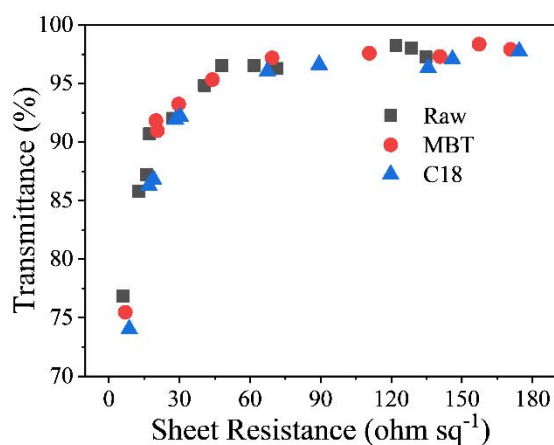


Figure S3. Plot of R_s versus transmittance at 550 nm for raw AgNW, C18-AgNW, and MBT-AgNW.

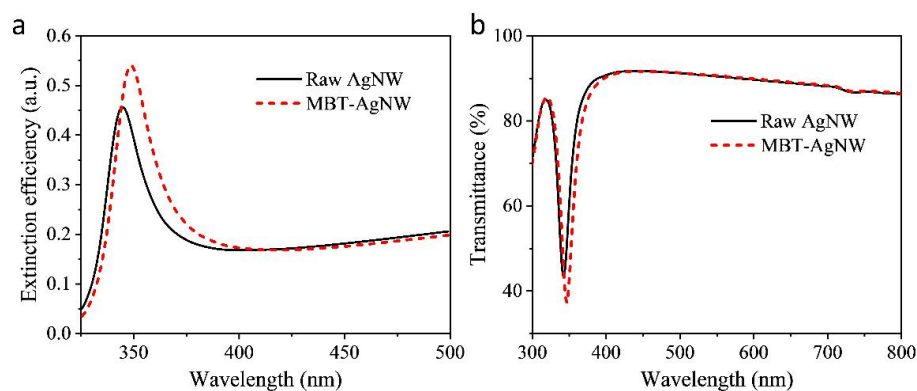


Figure S4. FDTD simulation of (a) extinction efficiency and (b) transmittance spectra of raw AgNW and MBT-AgNW, the nanowire diameter is 30 nm and the SAM thickness is set as 1.5 nm.

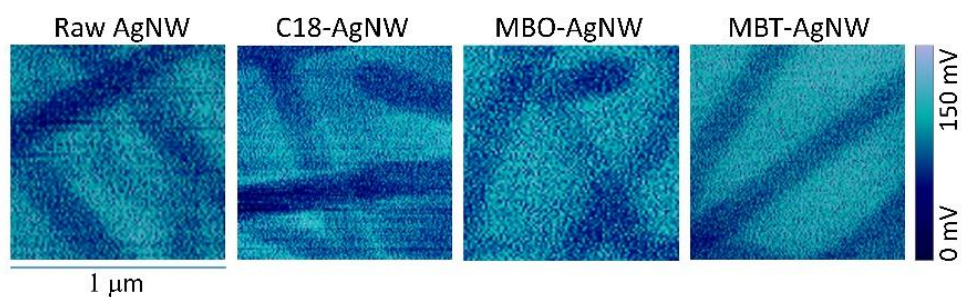


Figure S5. Surface potential images of raw AgNW, C18-AgNW, MBO-AgNW, and MBT-AgNW networks on silicon substrates.

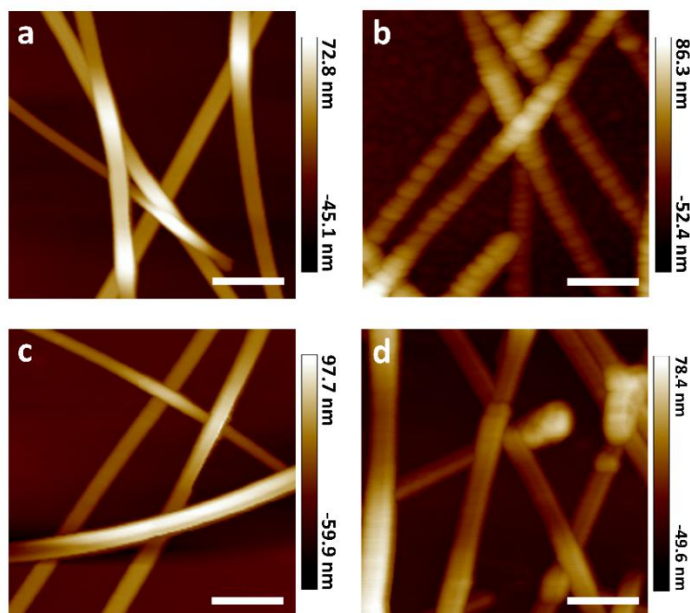


Figure S6. Atomic force images of (a) raw-AgNW, (b) C18-AgNW, (c) MBT-AgNW, and (d) MBO-AgNW.

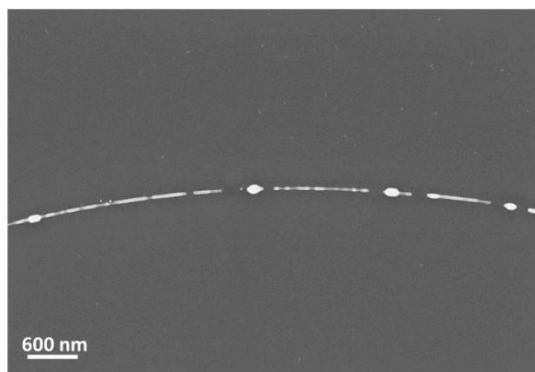


Figure S7. SEM image of the C18-AgNW after thermal annealing, showing periodic aggregations on the nanowire.

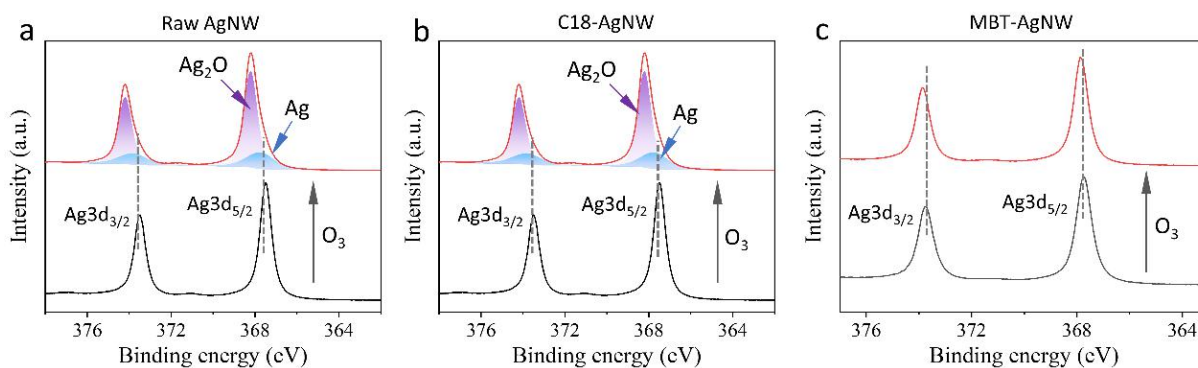


Figure S8. Ag3d XPS spectra of the (a) raw AgNWs, (b) C18-AgNWs and (c) MBT-AgNW before and after the oxidation treatment with 10k ppm for 1 hour. The XPS peaks of Ag3d_{3/2} and Ag3d_{5/2} shift to higher binding energies (E_b) from (373.48, 367.48 eV) to (374.18, 368.18 eV) for the raw AgNWs and (373.85, 367.85 eV) to (374.41, 368.41 eV) for the MBT-AgNWs after the oxidation treatment, respectively.

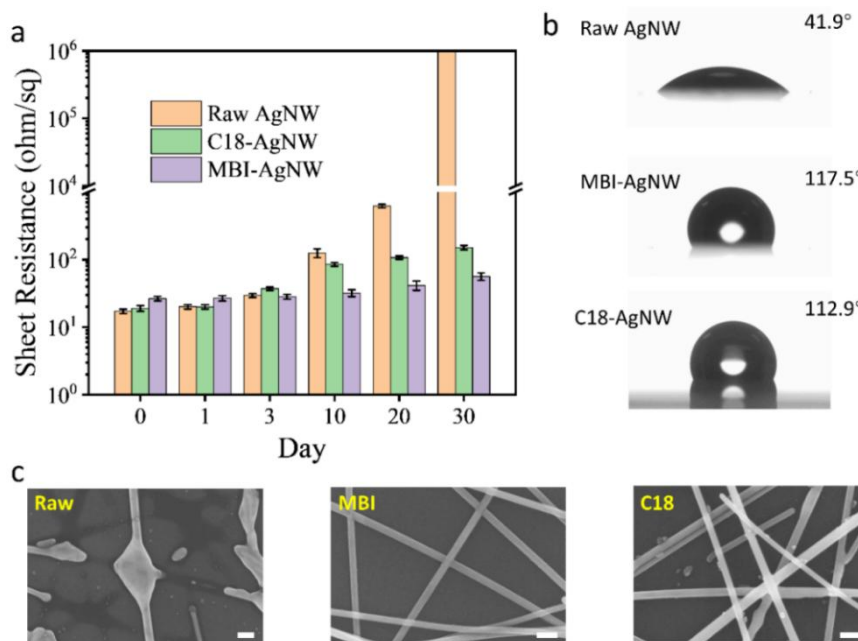


Figure S9. (a) Variation in sheet resistance of raw AgNWs, C18-AgNWs, and MBI-AgNWs under a one-month accelerated aging test of 85 °C and 85% relative humidity. (b) Water contact angles of raw AgNW, C18-AgNW, MBI-AgNW networks on glass substrates. (c) SEM images of raw AgNWs MBI-AgNWs, and C18-AgNWs after the aging test.

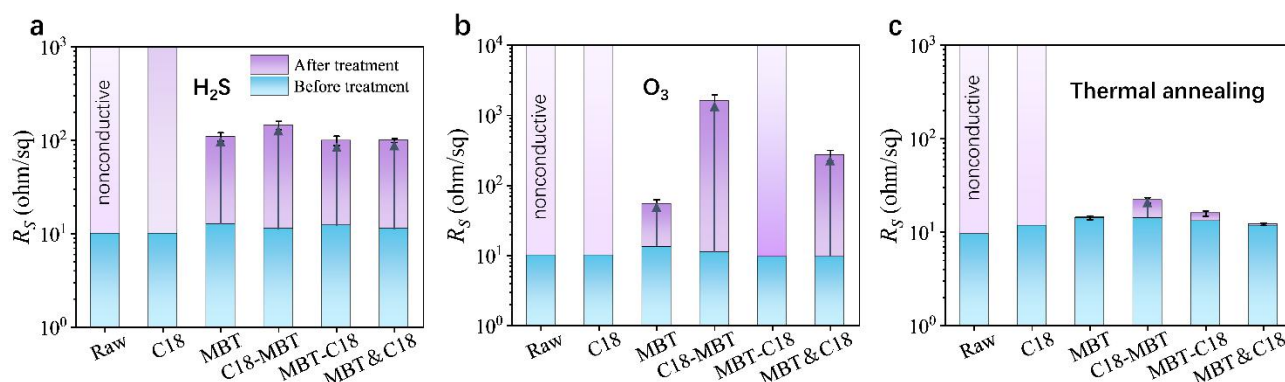


Figure S10. (a) Sulfidation, (b) oxidation, and (c) thermal annealing tests on raw AgNWs and the SAM-modified AgNWs. The gas concentrations of H₂S and O₃ are 150k ppm (2 hours) and 100k ppm (30 min), respectively. The annealing temperature is 280 °C for 1 hour.

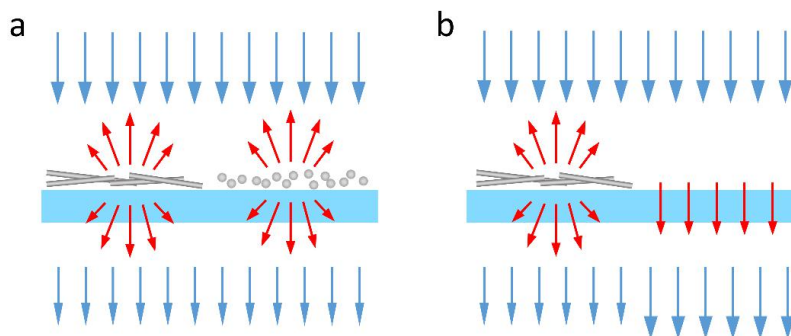


Figure S11. Schematic of the optical visibility for the (a) PRI-induced and (b) etched/removed AgNW patterns.

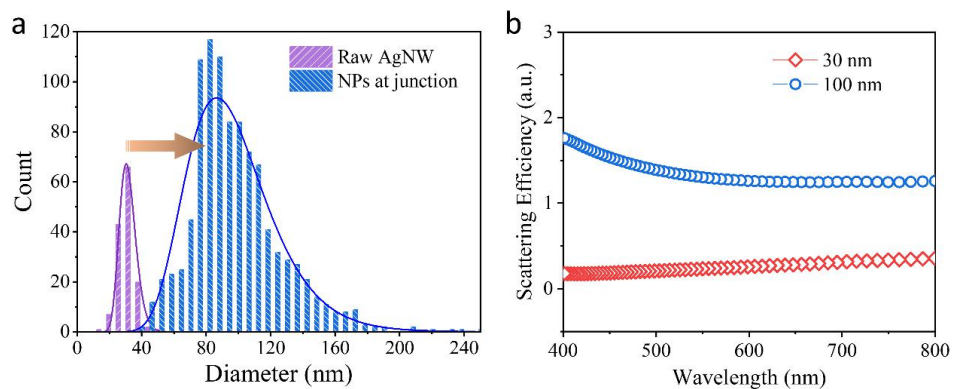


Figure S12. (a) Diameter statistics of the raw AgNWs and nanoparticles (NPs) formed at the junctions of the C18-AgNW network which has been annealed at 190 °C for 8 min. (b) Simulated scattering efficiency of individual nanowires with diameters of 30 and 100 nm.

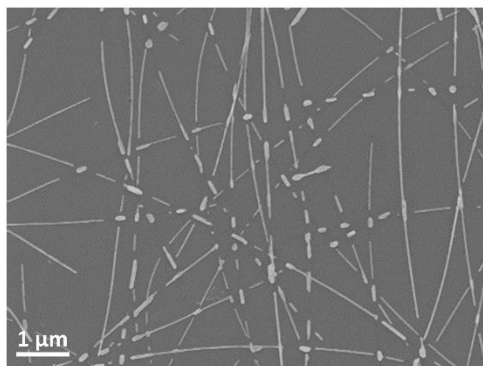


Figure S13. SEM image of the annealed C18-AgNW network with most breakdown at the junctions between NWs.

Table S1. Performance comparison of the AgNW-based heaters

Material	Diameter (nm)	Voltage (V)	Maximum Temperature (°C)	Ref
AgNW	/	5	275	[1]
AgNW	100	9	~80	[2]
NiO-AgNW	30	7	185	[3]
Ag-COOH/-NH ₂	60	8	175	[4]
AlO _x -AgNW	30	7	81	[5]
AgNW	80	5.5	124	[6]
PEDOT:PSS/ITO-AgNW	35	11	115	[7]
GZO-AgNW-GZO-cPI	100	6	76	[8]
AgNW-PI	60-80	6	96	[9]
Ni-AgNW	40	30	284	[10]
FTO-NiCr-AgNW	50	7	193	[11]
UV polymer-AgNW	30	12	93.5	[12]
SWCNT-AgNW	40	16	182	[13]
Conductive polymer-AgNW	35	20	~200	[14]
TiO ₂ -AgNW	53	7	235	[15]
Welded-AgNW	30	6	145	[16]
ANFs-AgNW	40	2.5	~260	[17]
rGO-AgNW	350	-	458	[18]
PDMS-AgNW	90	2	160	[19]
MBT-AgNW	30	7	319	Our work

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