

Supporting Information

Switchable Silver Mirrors with Long Memory

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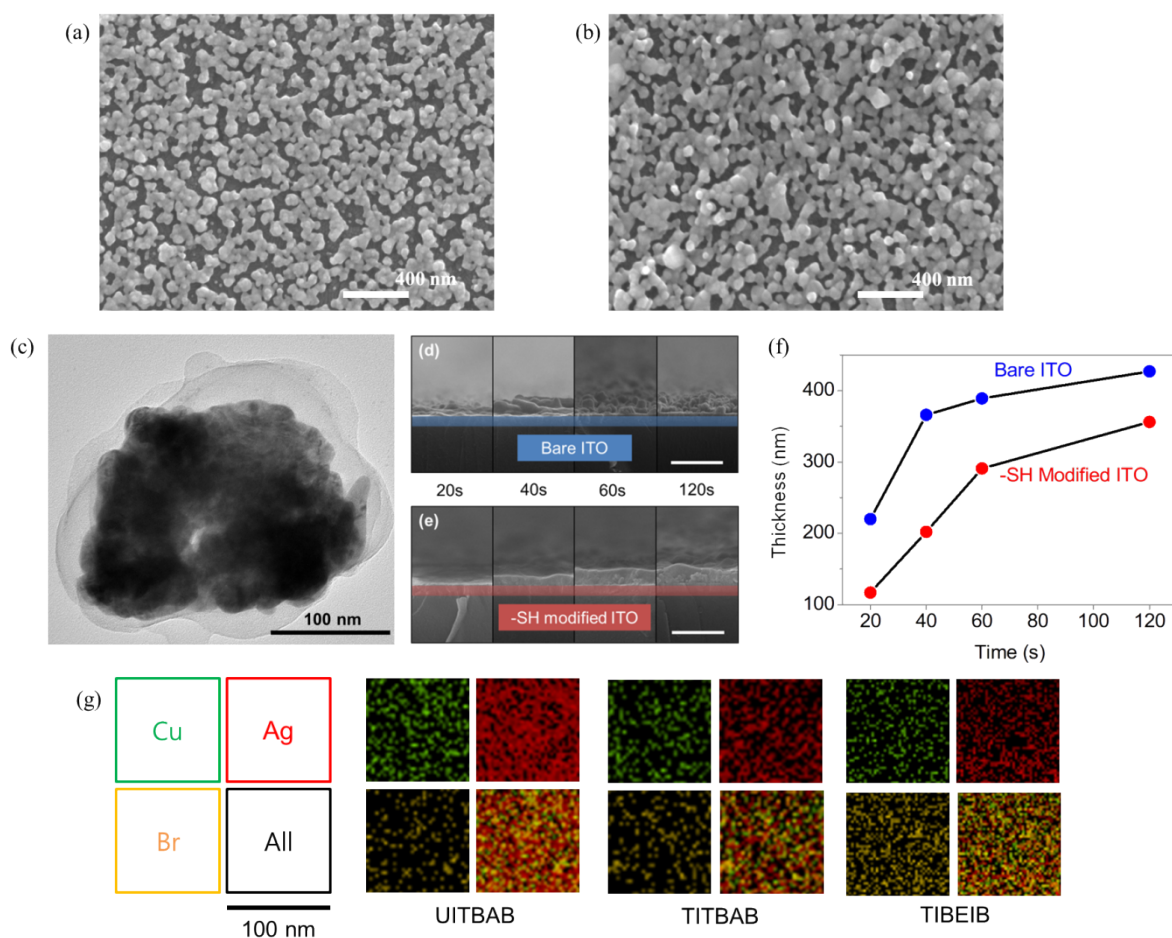


Fig S1. SEM images of Ag deposited electrodes (a) without Cu, and (b) with Cu content (Ag was deposited by applying -2.5V potential for 1min on UI electrode). (c) TEM image of the particle detached from the metallic layer of UITBAB. SEM images of the electrodeposited metallic films: The cross-sectional images of the metallic films of (d) UITBAB and (e) TITBAB grown under the application of -2.5 V for 20~120 s. Scale bars, 1 μm. (f) Thickness of the electrodeposited metallic films grown under the application of -2.5 V for 20 ~120 s. (g) EDS images corresponding to Ag, Cu, and Br atom maps for UITBAB, TITBAB, and TIBEIB, respectively.

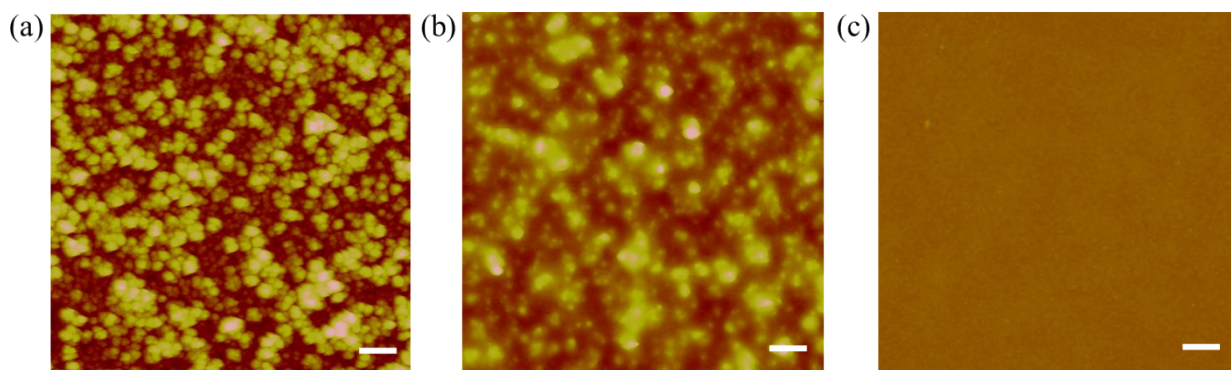


Fig S2. AFM images of the metallic films from (a) UITBAB (Roughness 66nm), (b) TITBAB (Roughness 37nm), and (c) TIBEIB (Roughness 2.7nm). Scale bars 1 μ m.

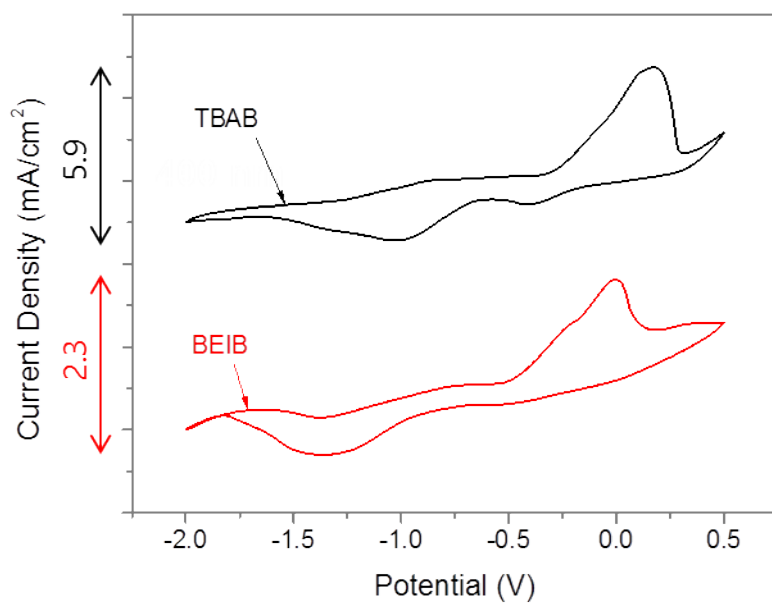


Fig S3. Cyclic voltammograms of TBAB (0.5 mM AgNO₃, 2.5 mM TBABr, 0.1 mM CuCl₂ in DMSO 10 ml with 10wt% of PVB), and BEIB (45.0 mM BEIBr, 0.5 mM AgNO₃, 0.1 mM CuCl₂ with 10wt% of DMSO) at a scan rate of 100mVs⁻¹ with a 1mm diameter Pt disk as the working electrode and Ag/AgCl as the reference electrode.

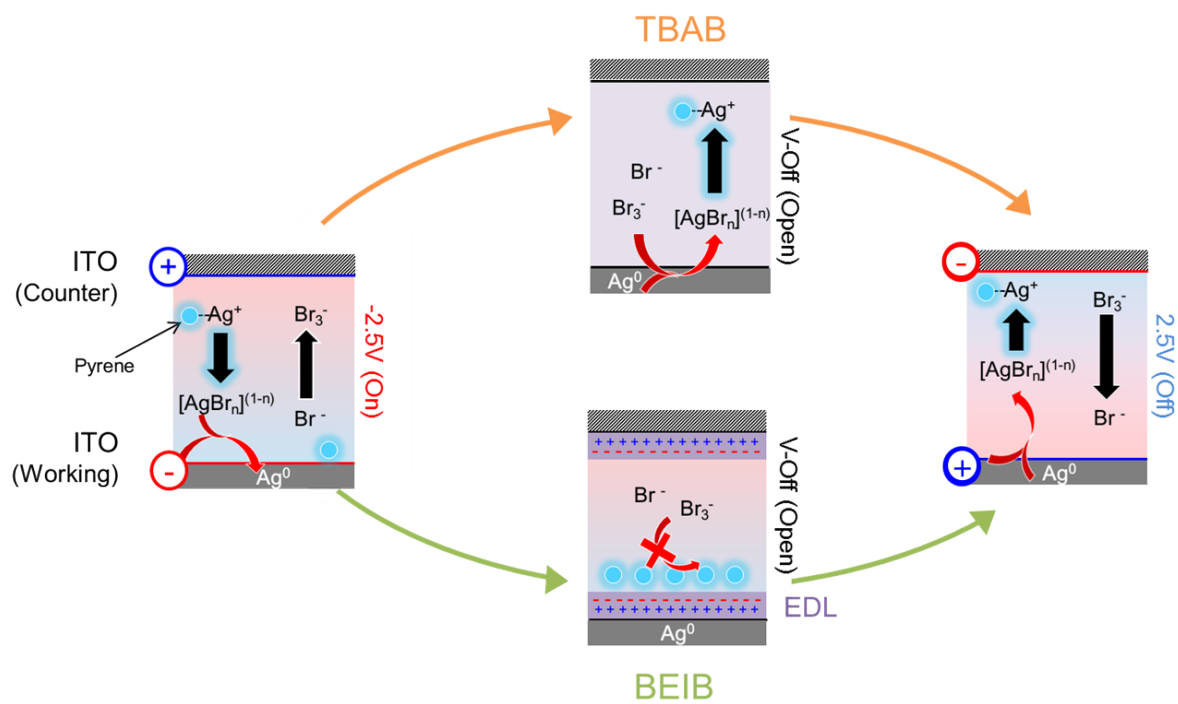


Fig S4. Schematic diagram of Ion transport of TBAB and BEIB, which was elucidated by pyrene as a fluorophore for reflective, V-off and transparent states.

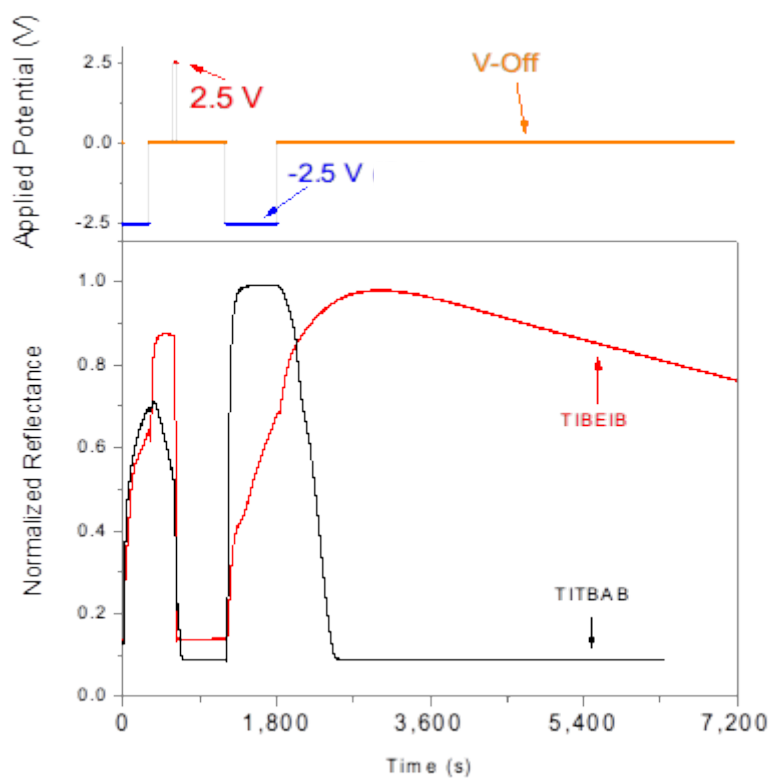


Fig S5. The normalized reflectance of TIBEIB and TITBAB recorded at 650 nm. The normalized reflectance was determined by dividing the reflectance by the maximum reflectance.

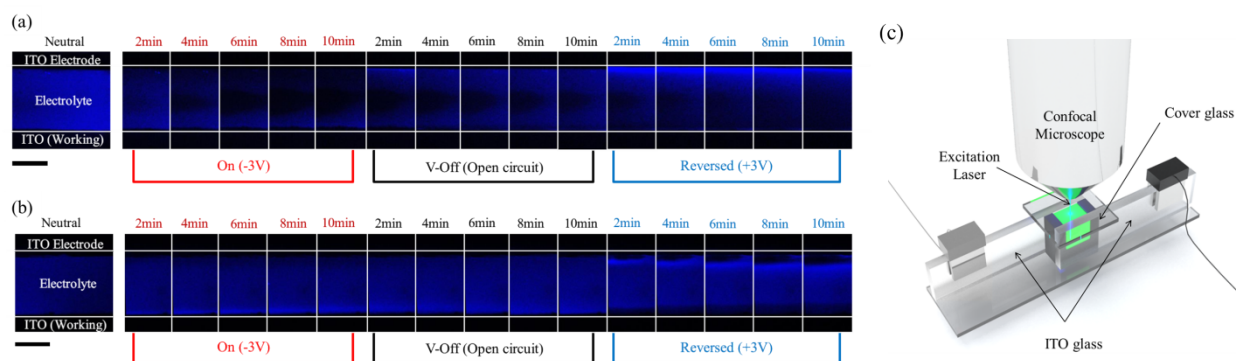


Fig S6. Confocal microscopic fluorescence images of (a) TBAB and (b) BEIB were recorded every 2min. (c) Schematic diagram on the cross-cut measurement for the confocal microscope using a switchable mirror, consisted of two ITO electrode and electrolyte.

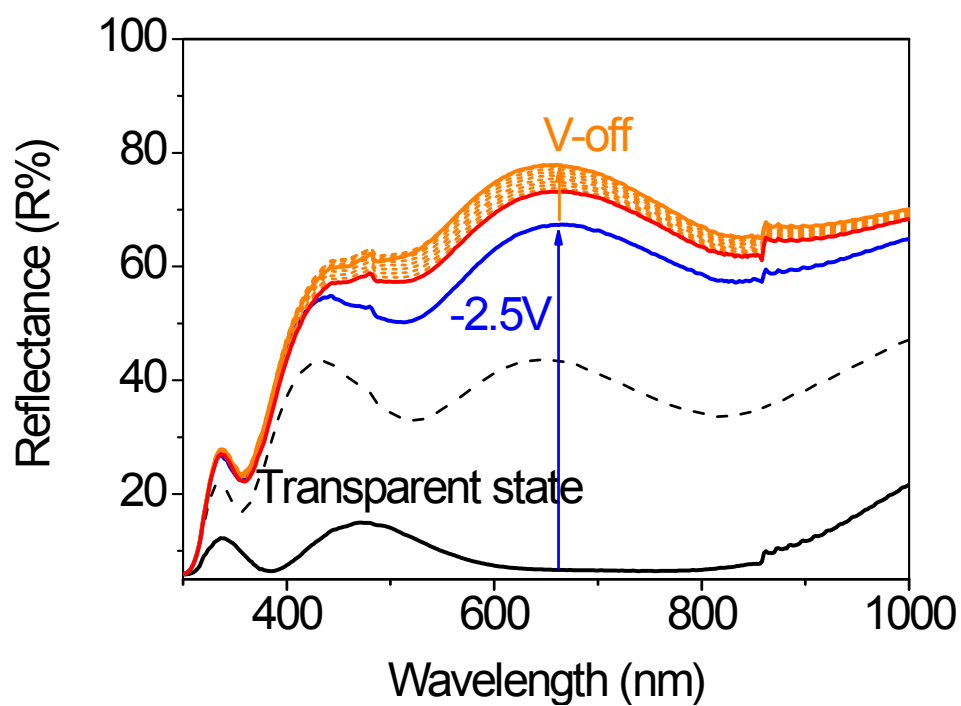


Fig S7. Reflectance spectra of TIBEIB at different states: From initial transparent state (solid black), 5min after application of -2.5V after (dashed black) to 10min (blue), V-Off state for 15 min (orange), and 60min (Red). Reflectance spectra measured every 5min while V-Off state are plotted as dashed orange lines.

Table S1. At% and molar ratio of Ag:Cu of electrodeposited mirror layer from EDS

	UITBAB [At%]	TITBAB [At%]	TIBEIB [At%]
Ag	40.2	11.9	6.6
Cu	12.9	3.9	2.1
Br	0.6	0.7	0.8
S	1.3	8.7	8.4
O	45.0	74.8	82.1
N	0.0	0.0	0.0

	UITBAB	TITBAB	TIBEIB
Ag/Cu	3.1	3.1	3.1

Table S2. Switching properties of the electrochemical mirrors.

	Composition	Working Electrode	R_0 [%]*	$R_{0.5}$ [%]	R_1 [%]	R_3 [%]	R_5 [%]	R_{10} [%]	R_{30} [%]
1 UITBAB	AgNO ₃ , TBABr, CuCl ₂ , PVB, DMSO	-	49.6	45.0	37.9	17.5	11.5	9.0	-
2 TITBAB	AgNO ₃ , TBABr, CuCl ₂ , PVB, DMSO	-SH	84.5	83.8	82.6	37.2	27.5	9.4	-
3 TIMHIB	AgNO ₃ , CuCl ₂ , MHIBr, DMSO	-SH	61.8	61.5	60.9	67.3	74.3	80.14	81.5
4 TIBEIB	AgNO ₃ , CuCl ₂ , BEIBr, DMSO	-SH	87.0	88.2	88.9	89.3	89.2	88.5	85
5 TIBHIB	AgNO ₃ , CuCl ₂ , BHIBr, DMSO	-SH	41.3	40.9	40.9	40.3	40.6	42.4	44.9

* R_n represents the reflectance of 650nm at n min after switched with -2.5V applied for 30min. Thus R_0 means the reflectance at right after the switching process finished, and $R_{0.5}$, R_1 , R_3 , R_5 , R_{10} , R_{30} means the reflectance at 30s, 1min, 3min, 5min, 10min, 30min after electricity off, respectively. The highest reflectance value for each compositions are bolded.

Movie S1. Electrochemical stability of the TITBAB

Movie S2. Bistability of the TIBEIB

Movie S3. Reversible switching of TIBEIB

Movie S4. *In-situ* confocal microscopic movie of TITBAB

Movie S5. *In-situ* confocal microscopic movie of TIBEIB