Supplementary Information

Bimodal phase separated block copolymer / homopolymer blends self-assembly for hierarchical porous metal nanomesh electrodes

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Figure S1. SEM images of PS-cylinder forming PS-*b*-PMMA formed on the large area, without dewetting. In the below SEM image, the Moiré pattern is observed due to ordered BCP domain



Figure S2. 60°-tilted SEM image of PS-cylinder forming PS-*b*-PMMA.



Figure S3. SEM images of thermal & solvent annealed PMMA-cylinder forming PS-*b*-PMMA and its Voronoi analysis.



Figure S4. SEM image of solvent annealed PS-*b*-PMMA (105 kg/mol-*b*-106 kg/mol) and PS homopolymer (50 kg/mol) and period analysis.



Figure S5. SEM images of solvent annealed blending thin film of PS-*b*-PMMA (62 kg/mol-*b*-143 kg/mol) and PS homopolymer (230 kg/mol) [blending weight ratio (a) 10:0, (b) 9:1, (c) 8:2 and (d) 7:3).



Figure S6. AFM image of our self-assembled transparent electrode and corresponding surface roughness (RMS: 4.936)



Figure S7. SEM images of metal network thin films from (a) bimodal cylindrical BCP (PS-*b*-PMMA, 62 kg/mol-*b*-143 kg/mol)/PS homopolymer (230 kg/mol) with blending weight ratio of 7:3 and (b) neat lamellar BCP (105 kg/mol-*b*-106 kg/mol). (c) and (d) are the colorized mapping of (a) and (b) respectively. Each connected network is shown in a separated color to visualize the connectivity.



Figure S8. (a, b) SEM images of porous metallic film fabricated from self-assembled nanotemplate consisting of PS, PMMA homopolymer. [inset of (b): Optical image of that]. (c) Porosity analysis of (a). (d) The average distance from the non-conducting center point to metallic collector of (a).

	t (nm)	α (cm ⁻¹)			t _{eff}	α_{eff} (cm ⁻¹)			
		at 450nm	at 550 nm	at 650 nm	(nm)	at 450nm	at 550 nm	at 650 nm	
Ag 7:3		23147	11198	11315	7.8	59352	29013	28714	
Au 7:3		19708	11560	16786	7.8	50535	43042	29641	
Au 8:2		29797	13633	23435	9	63397	49862	29006	
Au 10:0	20	39036	15495	30917	13.6	57406	45466	22787	
Au Micrometer scale patterned thin film	20	42835	52165	33472	13.2	64902	50716	79038	
Au Thin film		73534	88399	53652	20	73534	53652	88399	

Table S1. The absorption coefficient (α , α_{eff}) with regard to practical and effective film thickness ($t_{eff} = t \cdot (1 - \text{porosity})$) of our self-assembled transparent electrode.

Year	Journal	Volume (issue)	Page	Transmittance at 550 nm (%)	Sheet resistance (ohm/sq)	Average space dimension (µm)	Metal grid thickness (nm)	Metal grid width (nm)
2013	ACS Nano	7(6)	5024-31	78	10	200	~ 125	12000
2014	ACS Nano	8 (10)	9807-14	87	655	80	~ 38	6500
2014	ACS Appl. Mater. Interfac es	6 (15)	12380-7	75	66	40	90	4500
2014	Adv. Mater.	26(6)	873-77	88	10	4-100	1-2	60
2015	Adv. Func. Mater.	26 (6)	833-40	89	18	4	184	80
2017	ACS nano	ASAP	DOI: 10.1021/a csnano.7b 03821	~ 84	97.8	~ 100	-	~ 1200
This work (blending ratio)			80.7 (8:2_Au) 85.7 (7:3_Au) 90.1(7:3_Ag)	33 (8:2_Au) 41 (7:3_Au) 39 (7:3_Ag)	0.8 (8:2) 1.4 (7:3)	15~20	25~35	

Table S2. The summary of researches for metal grid-type transparent electrodes.