Electronic Supplementary Information

Control of Thermal Deformation with Photonic Sintering of Ultrathin Nanowire Transparent Electrodes

Zhaoyang Zhong, ‡[a] Seung-Hyun Lee, ‡[a] Pyeongsam Ko, [ab] Sin Kwon,[a] Hongseok Youn,[b] Jae Young Seok,*[a] and Kyoohee Woo,[a]*

[a]*Advanced Manufacturing Systems Research Division, Korea Institute of Machinery and Materials (KIMM), Daejeon 305-343, Republic of Korea. E-mail: khwoo@kimm.re.kr, seokjy89@kimm.re.kr*
[b]*Department of Mechanical Engineering, Hanbat National University, Dongseodaero 125, Yuseong-gu, Daejeon, 34158, Republic of Korea*

‡ Both authors contribute equally to this work.

Table S1. The comparison of characteristics of IPL-sintered NW flexible transparent electrodes

Optoelectrical property			Mechanical flexibility			Ref.
Rs	T%	FoM*	Bending radius	Bending cycles	R/R_0	
14.4 Ω/sq	89.5%	0.023	Bending radius: 10 mm Twisting angle: 45°	20000	~1	This work
26 Ω/sq	88%	0.011	2 mm	1000	1.15	33
24.5 Ω/sq	90%	0.014	0.5 mm	50000	~1	34
51.27 Ω/sq	95.3%	0.012	-	10000	1.06	35
19 Ω/sq	83%	0.008	-	1000	1	36

*FoM: Figure of Merit for transparent conductive materials defined by G. Haacke. [37]

Table S2. The material properties and boundary conditions used in the simulation

Specific heat capacity of Ag NW/PET	235/1030 (J kg^{-1} K^{-1})
Density of Ag NW/PET	10500/1430 (kg m^{-3})
Thermal conductivity of Ag NW/PET	429/0.189 (W m^{-1} K^{-1})
Convective heat transfer coefficient on top surface of Ag NW & PET	30 (W m^{-2} K^{-1})
Convective heat transfer coefficient on bottom surface of PET	300 (W m^{-2} K^{-1})
Emissivity of Ag NW/PET	0.1/0.9
Interface heat transfer coefficient between Ag NW and PET	120,000 (W m^{-2} K^{-1})
Room temperature	20.15 °C
Compensation factor of Ag NW/PET	0.043/0.122

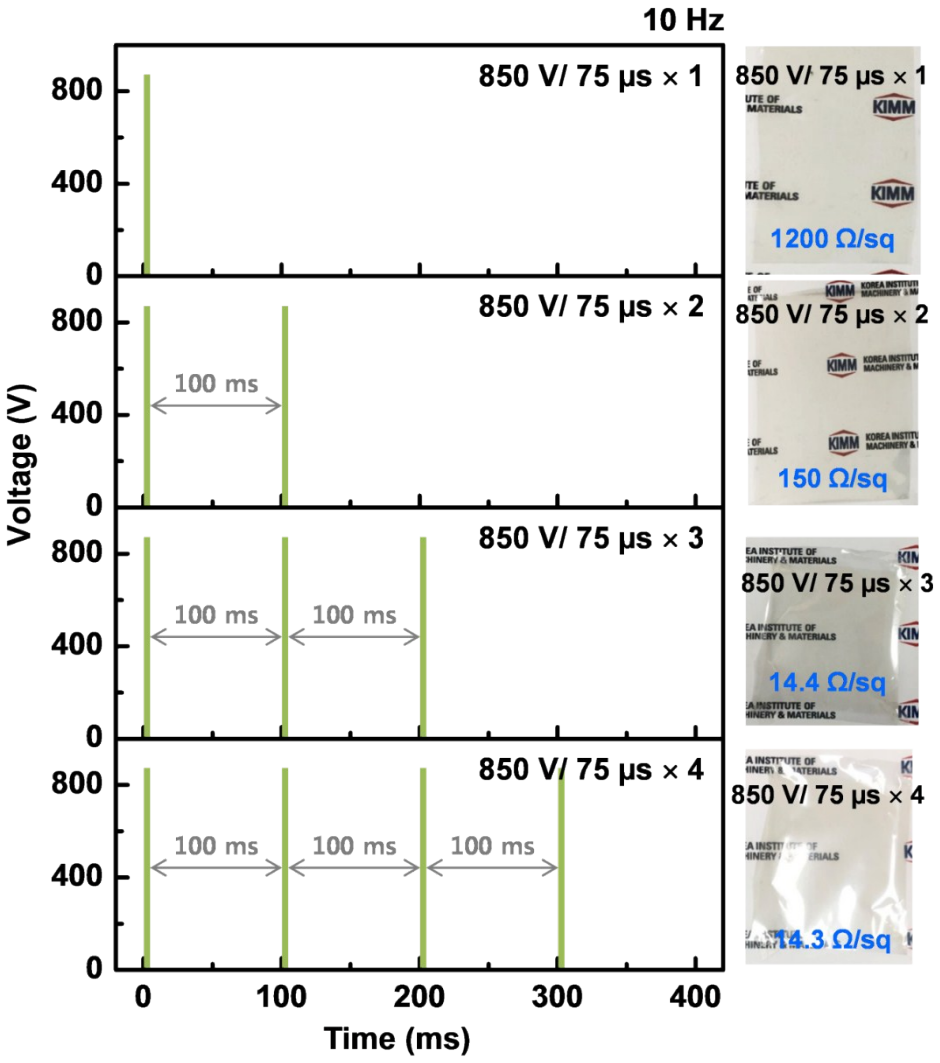

Figure S1. Multiple pulse energy irradiation conditions with controlled number of pulses from 1 to 4. Each pulse was operated at 850 V/75 μs and the frequency was set to 10 Hz. The photographs are of the Ag NW films and their sheet resistance values after IPL irradiation.

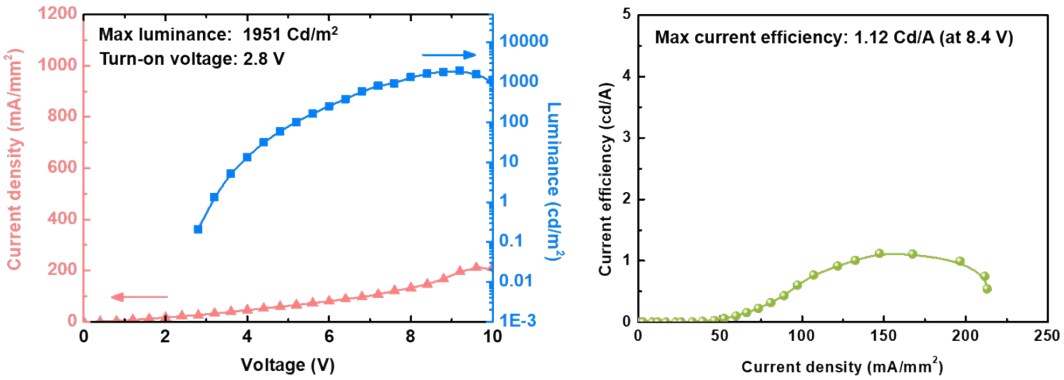

Figure S2. Current density–voltage–luminance (*J*–*V*–*L*) characteristics and current efficiency of the OLED device based on the highly flexible Ag NW transparent electrode on the 10 μm ultrathin PET substrate.

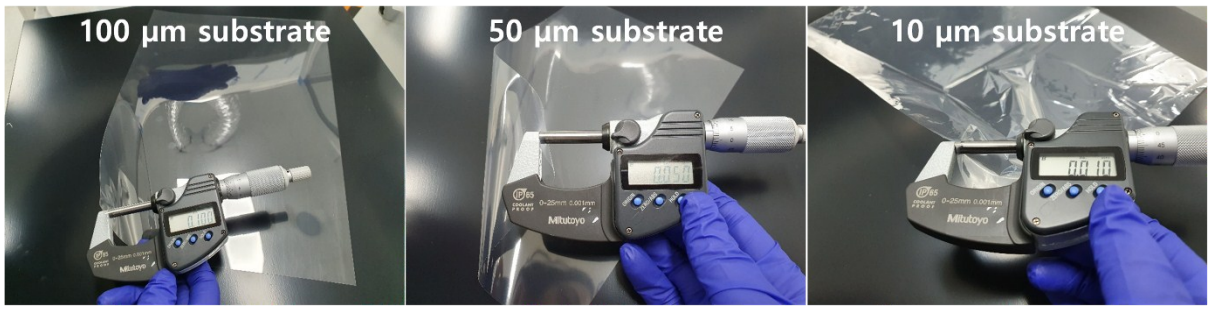

Figure S3. Photographs for measuring the substrate thickness by using a digital Vernier Caliper.