Supplementary Information

Entirely solution-processed and template-assisted fabrication of metal grids for flexible transparent electrodes

Nam-Su Jang,[a] Soo-Ho Jung,[b] Eun Jeong An,[c] Jin-Woo Oh,[a,d] Hye Moon Lee *[b,e] and Jong-Man Kim *[a,d]

[a] Research Center for Energy Convergence Technology, Pusan National University, Busan 46214, Republic of Korea

[b] Powder & Ceramics Division, Korea Institute of Materials Science, Changwon 51508, Republic of Korea

[c] Sensor R&D Division, Korea Institute of Robot and Convergence, Pohang 37666, Republic of Korea

[d] Department of Nanoenergy Engineering, Department of Nano Fusion Technology, and BK21 Plus Nano Convergence Technology Division, Pusan National University, Busan 46214, Republic of Korea

[e] Alink Co. Ltd., Changwon 51508, Republic of Korea

* Corresponding authors: hyelee@kims.re.kr (H. M. Lee), jongkim@pusan.ac.kr (J. -M. Kim)

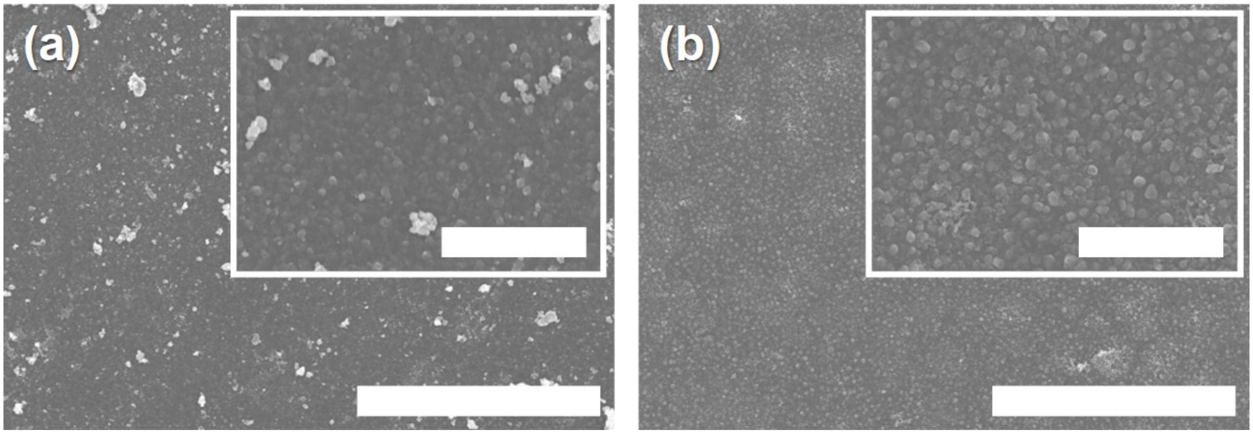

Fig. S1. Top-view scanning electron microscope (SEM) images of the Al film coated on the NOA substrate (a) before and (b) after tape peeling tests repeated up to 1000 times (scale bars: 10 μm) (inset: magnified SEM images (scale bars: 2 μm)).

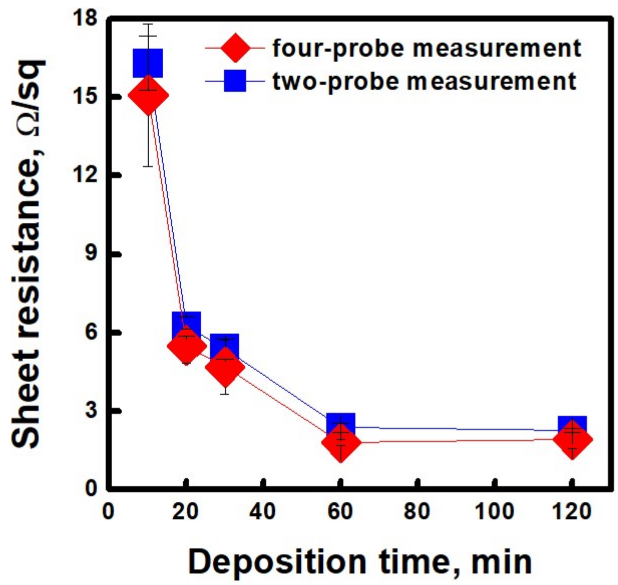

Fig. S2. Comparison of the sheet resistance (R_s) values of the wet-deposited Al films measured using the four- and two-probe methods.

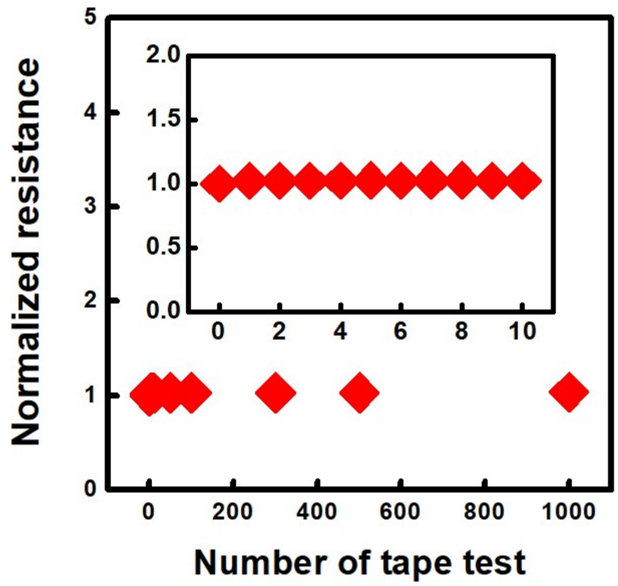

Fig. S3. Normalized resistance of the metal grid transparent electrode (MG TE) under repeated tape peeling tests up to 1000 cycles (inset: magnified view for the initial 10 cycles).

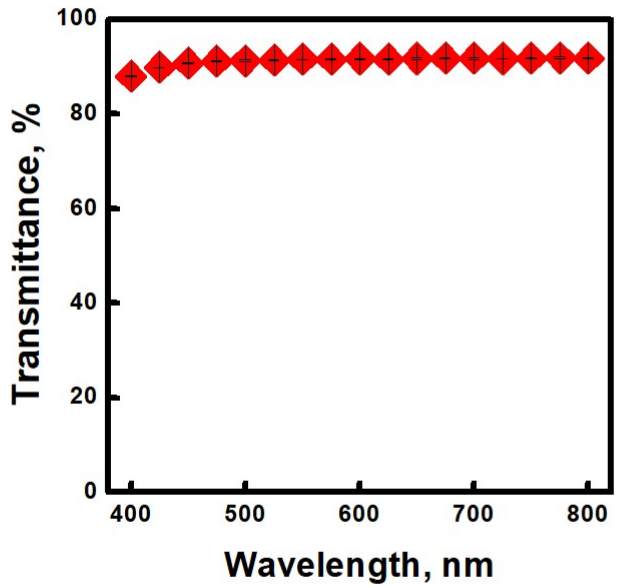

Fig. S4. Transmittance of the bare NOA substrate over the 400–800 nm wavelength range.

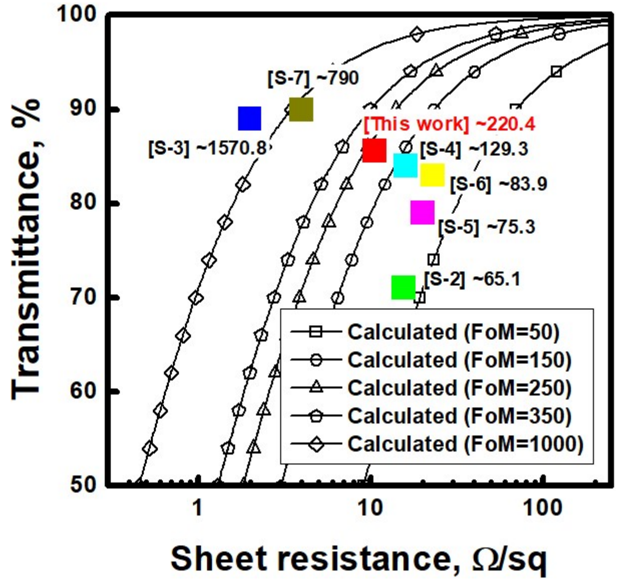

Fig. S5. Comparison of the FoM value of the fabricated MG TE with those of other MG-embedded flexible TEs in the literature.

It has been considered that a figure of merit (FoM) is an important performance indicator of a TE.[S-1] In this regard, the optoelectronic properties of the fabricated MG TE were compared with those of other MG-embedded TEs in the literature, based on the FoM,[S-2–S-7] as shown in Fig. S5.

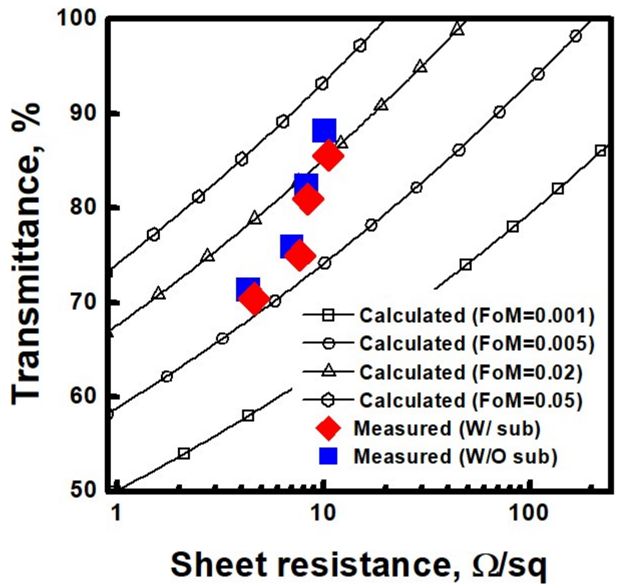

Fig. S6. Total transmittance of the MG TEs as a function of the sheet resistance with the figure of merit (FoM) curves estimated by the Haacke's definition.

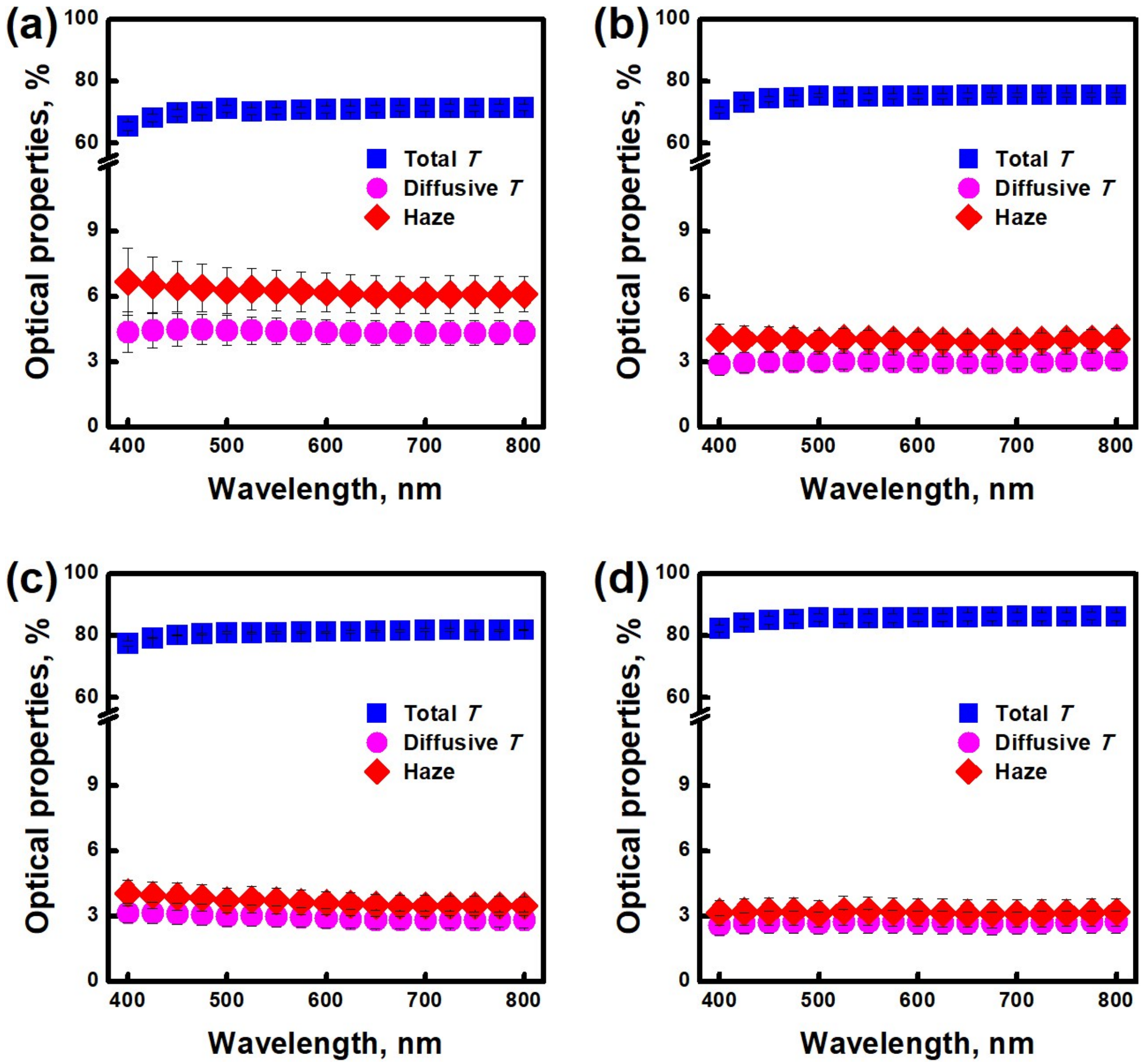

Fig. S7. Total and diffusive transmittance spectra and the corresponding haze values for the MG TEs at various $S_{g\text{–}g}$ values. (a) $S_{g\text{–}g}$ = 300 μm, (b) $S_{g\text{–}g}$ = 500 μm, (c) $S_{g\text{–}g}$ = 700 μm, and (d) $S_{g\text{–}g}$ = 1000 μm.

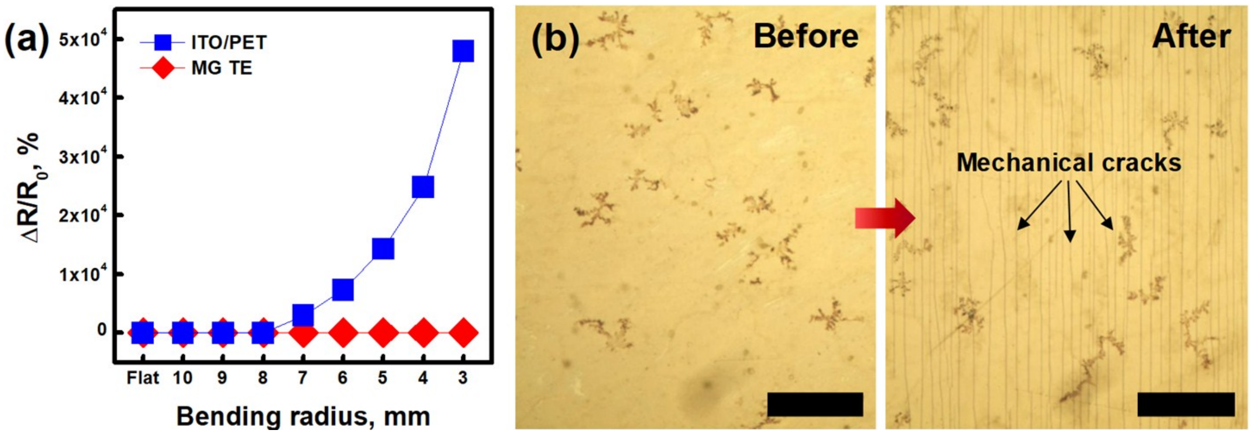

Fig. S8. Indium tin oxide (ITO) film on a plastic substrate under tensile bending deformations. (a) relative changes in the resistance ($\Delta R/R_0$) as a function of the bending radius (r_b) and (b) top-view optical microscope (OM) images of the surface of the ITO film before and after bending deformation at rb = 3 mm (scale bars: 500 μm).

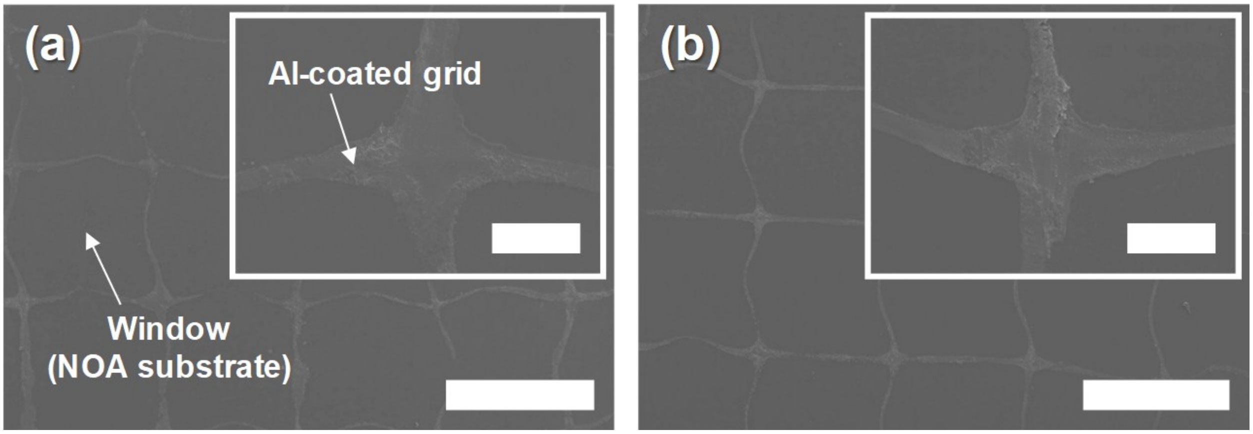

Fig. S9. Top-view SEM images of the MG TE (a) before and (b) after repeated tensile bending tests up to 1000 cycles at a bending radius of 5 mm (scale bars: 1 mm) (inset: magnified SEM images (scale bars: 100 μm)).

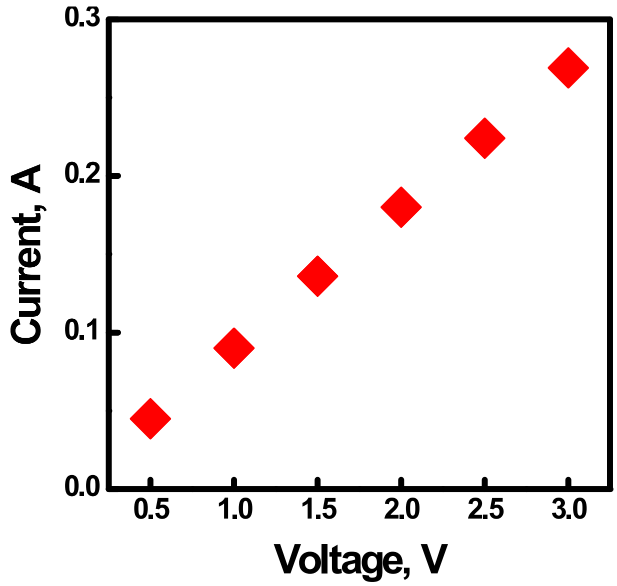

Fig. S10. Current-voltage characteristics of the MG heater.

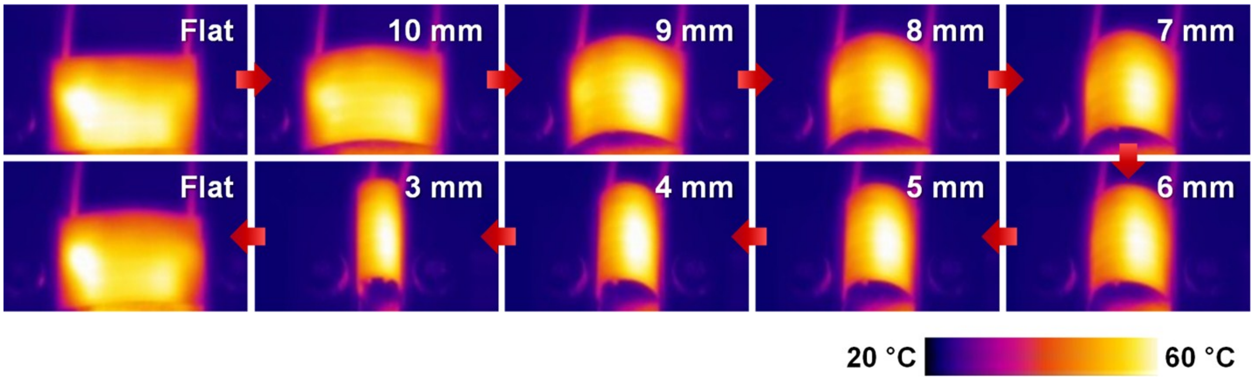

Fig. S11. Serial thermal camera images of the MG heater under bending deformation at various bending radii (input voltage 2.5 V).

References

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