Supporting Information

Highly Stable, Transparent and Conductive Electrode of Solution-Processed Silver Nanowire-Mxene for Flexible Alternating-Current Electroluminescent Devices

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Figure S1. SEM images of the AgNWs films with different concentrations of the AgNWs dispersion.
Figure S2. Photographs of AgNWs electrode a) before tape test, b) after tape test; hybrid electrode c) before tape test, d) after tape test; e-f) LED was lighted up using hybrid electrode before and after tape test.

Tape test was carried out by 3M tape with AgNWs electrode and hybrid electrode. As shown in Figure S2a and S2b, pure AgNWs electrode was detached significantly from the substrate and was mottled after tape test. However, the hybrid electrode remains relatively intact after testing (Figure S2c and S2d). Subsequently, the electrode was plugged into circuit and the LED was still illuminated (Figure S2e and S2f). It demonstrated that the addition of Mxene increased the adhesion of the electrode to the substrate.
The introduction of a small amount of Mxene sheets effectively soldered the AgNW junctions and reduced the contact resistance between the AgNWs, greatly enriching conductive path and increasing connection of conductive networks. However, as the Mxene density increased, the contact resistance between Mxene sheets becomes larger and the equivalent resistance also increased.

**Figure S3.** The equivalent circuit diagram of the hybrid electrode.
As shown in Figure S4, the bare AgNWs electrode without the Mxene protective layer has changed its morphology after one month of placing with oxides formed on the surface. In contrast, the hybrid electrode has not changed.
Figure S5. Resistance change of AgNWs and AgNWs-Mxene electrodes after exposure to H$_2$S gas.
Figure S6. SEM image of ZnS:Cu particles.
Figure S7. Electroluminescence spectrum of flexible ACEL devices.
Figure S8. Images of AgNWs-Mxene electrode (left) and bare AgNWs electrode (right) based ACEL devices.
Figure S9. The change in luminance of the pristine AgNWs ACEL device and AgNWs-Mxene ACEL device after 300 bending cycles under 90°. Illustration: the actual bending images of the AgNWs ACEL device (left) and AgNWs-Mxene ACEL device (right).