Supporting Information

Fully Indium-free Flexible Ag Nanowires/ZnO:F Composite Transparent Conductive Electrodes with High Haze

Jun Han,[a] Shuai Yuan,[a] Lina Liu,[a] Xiaofeng Qiu,[a] Haibo Gong,[a] Xiaopeng Yang,[a] Cuncheng Li,[a] Yufeng Hao,[b] Bingqiang Cao†[a]

[a] *Key Lab of Inorganic Functional Material in Universities of Shandong, School of Material Science and Engineering, School of Chemistry and Chemical Engineering, University of Jinan, Jinan 250022, China*

[b] *Department of Mechanical Engineering, Columbia University, New York, NY 10027, USA*

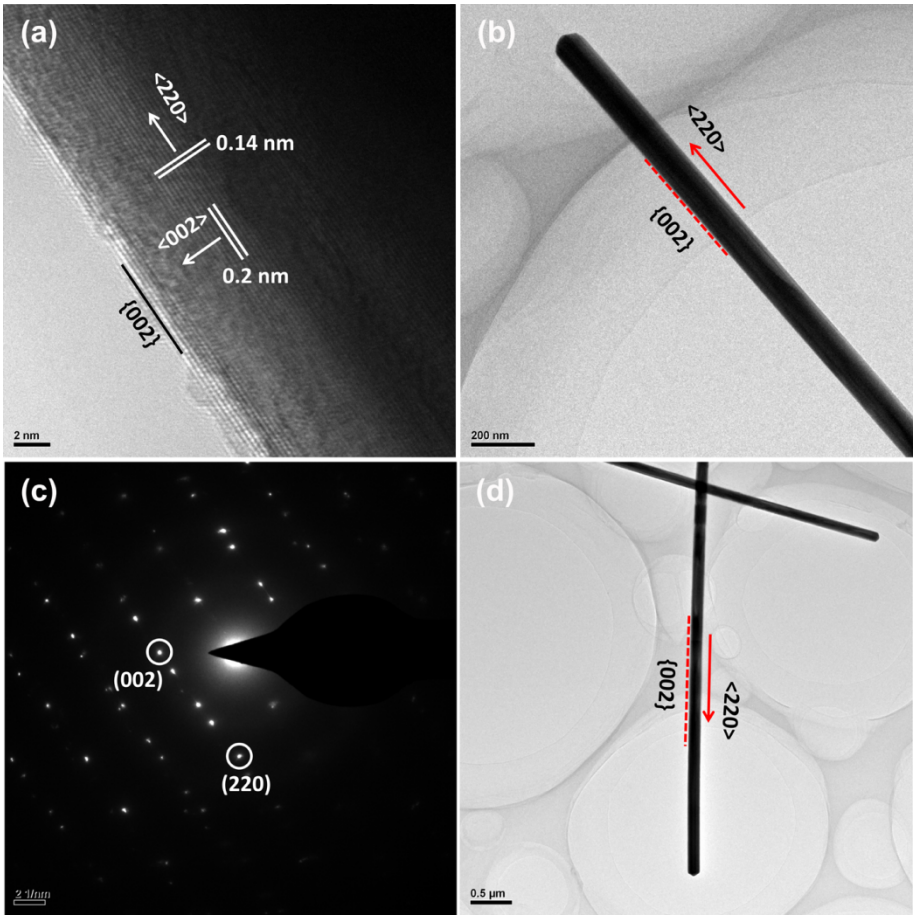

Figure S1. (a~b) TEM images of the as-synthesized Ag NW at different magnifications, HRTEM image of (a) taken from the edge of a random Ag NW presented in (b). (c) The SAED pattern of a single Ag NW. (d) TEM image of Ag NW relate to the SAED pattern of (c).

The morphology of as-synthesized Ag NWs was characterized by the high-resolution TEM examination and selected area electron diffraction (SAED). Figure S1a shows a TEM image taken from the edge of a random Ag NW presented in Figure S1b. Two types of lattice fringes with interplanar spacing of 0.14 and 0.20 nm, which respectively attribute to {220} and {002} planes of face-centered-cubic (*fcc*) Ag, are clearly observed in the image. This indicates that Ag NWs synthesized by our method grew along <220> direction, bound by {002} planes as the lateral surfaces, which is in accordance with both experimental observations and simulations of Ag NWs. Obviously, the growth direction of Ag NWs is perpendicular to the direction of lateral plane. The SAED pattern (Fig. S1c) recorded by focusing the electron beam on the lateral planes of a single Ag NW shown in Fig. S1d further confirmed that the growth direction of Ag NWs was along <220> direction and bound by {002} planes as the lateral surfaces.

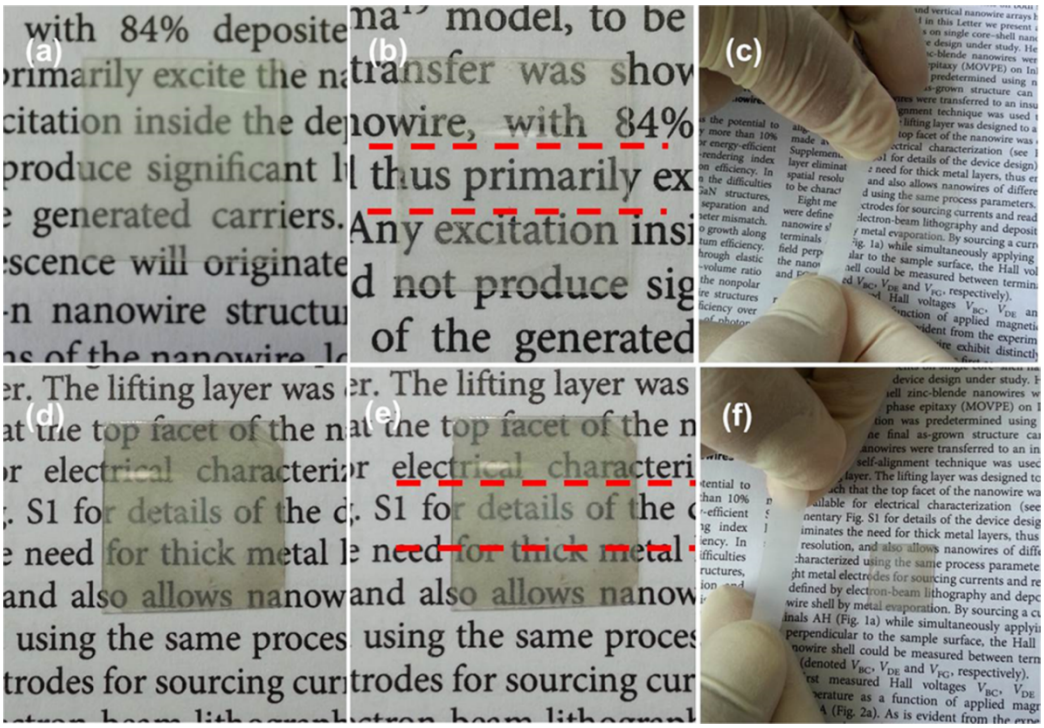

Figure S2. (a-c) Typical mechanical adhesion test of the Ag NW mesh, (a) before tape test, we note that the films appear very slightly milky due to light scattering from the nanowires, (b) after tape test, slightly milky disappear between the two dotted line due to part Ag NW mesh was peeled off, as shown in (c). (d-f) are the corresponding results for Ag NW/FZO composite electrode. The Ag NW/FZO composite film was not peeled off from the PET substrate.

The mechanical adhesion property was further tested by a typical tape adhesion test by controlling the pressure and the corresponding results are shown in Fig. S2. The Ag NW mesh can be easily peeled off (Fig. S2 a, b) by the tape, but the Ag NW/FZO composite is outstandingly stable (Fig. S2 d, f). This indicated that the FZO layer of our newly Ag NW/FZO composite can provide an effectively mechanical adhesion on substrate, which makes the Ag NW/FZO TCE meet the reliable requirements of device applications.