

Bending deformations of a hybrid two-layer graphene-silver nanowire film for the transparent electrode of flexible devices

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Transparent electrodes have been widely used in photovoltaics, photodetectors, flat panel displays, and touch screen devices due to its low sheet resistance and high optical transparency.

For the application of FDs, it is required to the high deformation limitations for the transparent electrode, which are crucially dependent on the radius of curvature. The critical radius of curvature moves toward decreasing values of 10 mm (bended) → 5 mm (rollable) → <3 mm (foldable), according to technology roadmap for FDs.

The conventional ITO electrodes are fragile and tend to electrically beak down when the critical radius of curvature becomes lower than 5mm. For this reason, the transparent electrodes with a higher deformation limitation are necessary for the highly flexible displays.

In our study, the mechanical limitations of a fivefold twinned silver nanowire (Ag NWs) and graphene layered film for flexible devices were investigated by the elastic radius test deformations.