Electronic Supplementary Information

ZnO Nanowire-based Photo-inverter with Pulse-induced Fast Recovery†

Syed Raza Ali Raza, §,[a] Young Tack Lee, §,[a] Seyed Hossein Hosseini Shokouh,[a] Ryong Ha,[b] Heon-Jin Choi,[b] and Seongil Im*[a]

[a]Institute of Physics and Applied Physics, Yonsei University, Seoul 120-749, Korea

[b]Department of Material Science and Engineering, Yonsei University, Seoul 120-749, Korea

*Corresponding author semicon@yonsei.ac.kr

§ Syed Raza Ali Raza and Young Tack Lee equally contributed to this work.

S1: Search or Localization of ZnO nanowire Under Optical Microscope

The ZnO nanowire (NW) FET source/drain (S/D) and gate (G) electrodes were patterned using an optical microscope (OM) and CCD equipped mask aligner. To realize the search/localization of NW under optical microscope, a micro-size dimension metal pre-pattern map as shown in optical microscope image ESI S1(a) was prepared using the photolithography. After pre-pattern map, the NW dispersion solution was dropped and dried on the substrate and it was quite easy to localize NW as shown in the magnified OM image of ESI S1(b). Despite of the fact that NW diameter was ~200 nm the length was 50 μm or even more so it was visible even under OM as shown in ESI S1 (b) & (c).

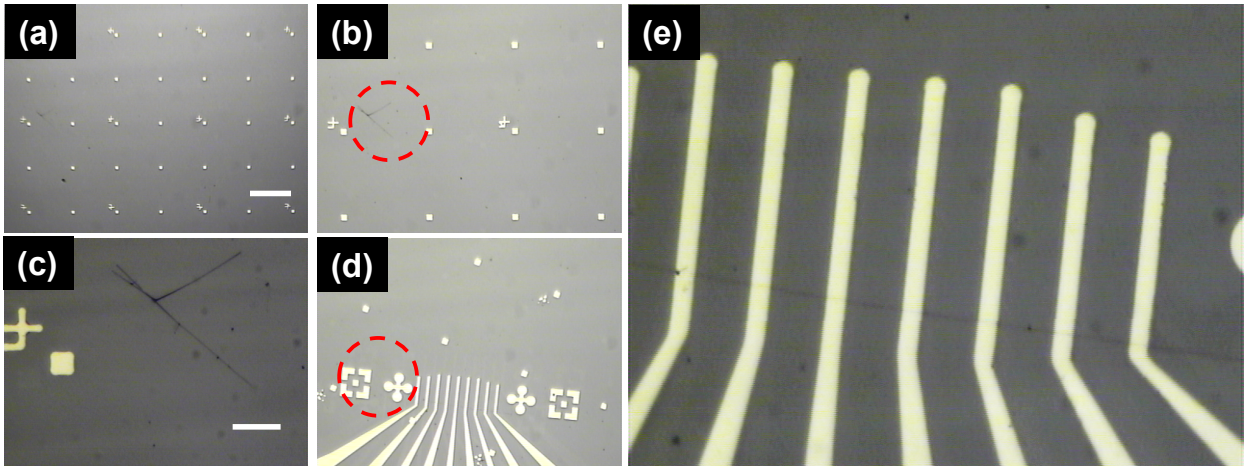

Figure S1. OM images: (a) Metal pre-pattern map on P^+-Si/SiO_2 substrate (scale bar is 120 μm), (b) metal pre-pattern map with NW highlighted in dotted red circle, (c) NW on substrate (scale bar is 20 μm), (d) S/D deposited on nanowire where the dotted red circle indicates the alignment markers for making the top gate electrode, (e) array of NW FETs on single long nanowire.

S2: Opaque and Transparent Gated ZnO NW FET under UV

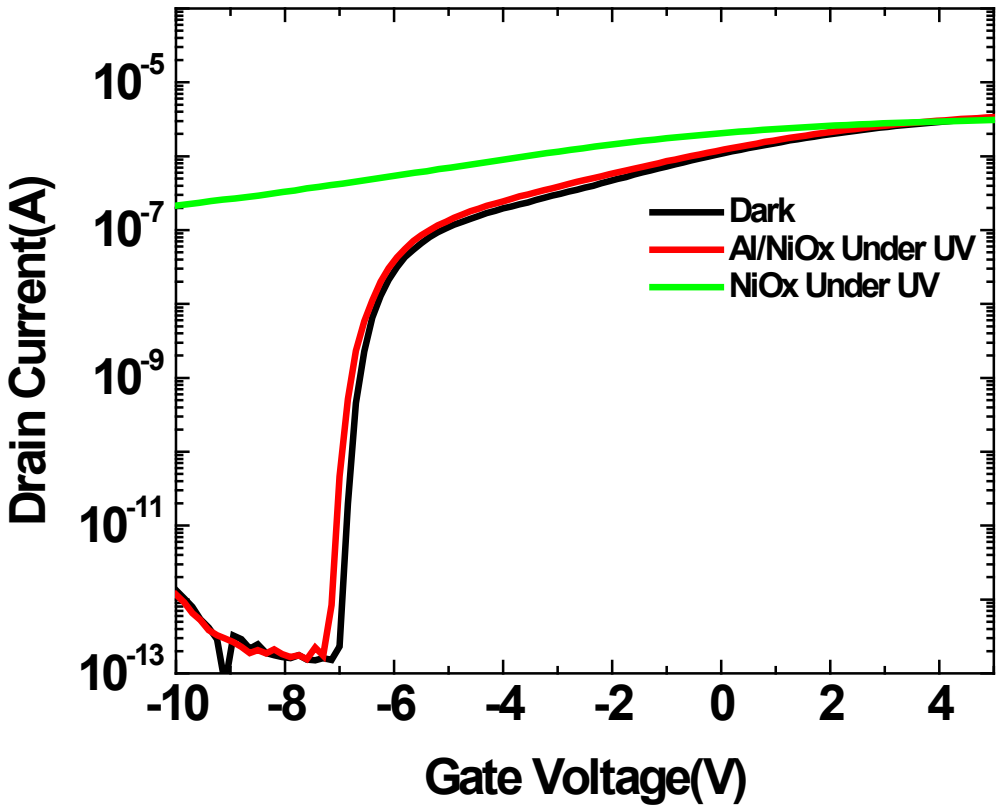

Figure S2. The ZnO nanowire (NW) FET transfer I_{DS}-V_{GS} properties dark (black), opaque Al/NiO_X top gate under UV (red) and transparent NiO_X top gate under UV (green). As shown above, the NW FET with an opaque Al/NiOx gate under UV does not respond much to the light showing an almost the same transfer curve behavior as that of the device in the dark. (V_{DS} = 1V)