Supplementary Information for:

A Fully Transparent Resistive Memory for Harsh Environments

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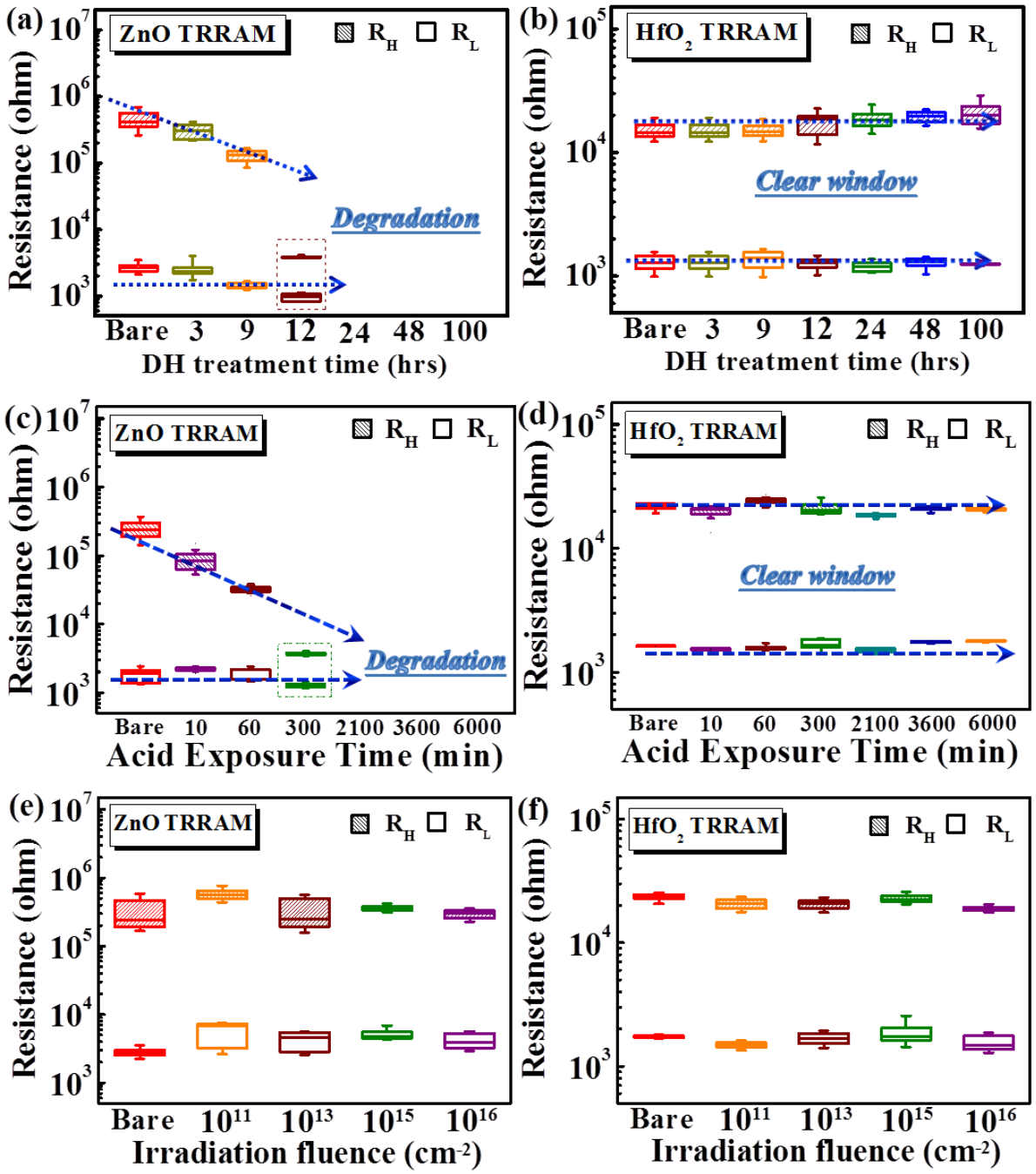

Figure S1. Resistance distributions of TRRAMs in harsh conditions. (a) The resistance distribution of ZnO TRRAM under damp heat tests for 100-hours with conditions (85 ℃, RH 90%). (b) The resistance distribution of HfO_2 TRRAM under damp heat tests for 100-hours with conditions (85 ℃, RH 90%). Resistance distributions in R_H and R_L of (c) ZnO TRRAM and (d) HfO_2 TRRAM under formic acid exposure. Resistance distributions in R_H and R_L of (e) ZnO and (f) HfO_2 TRRAM as a function of proton irradiation fluences.

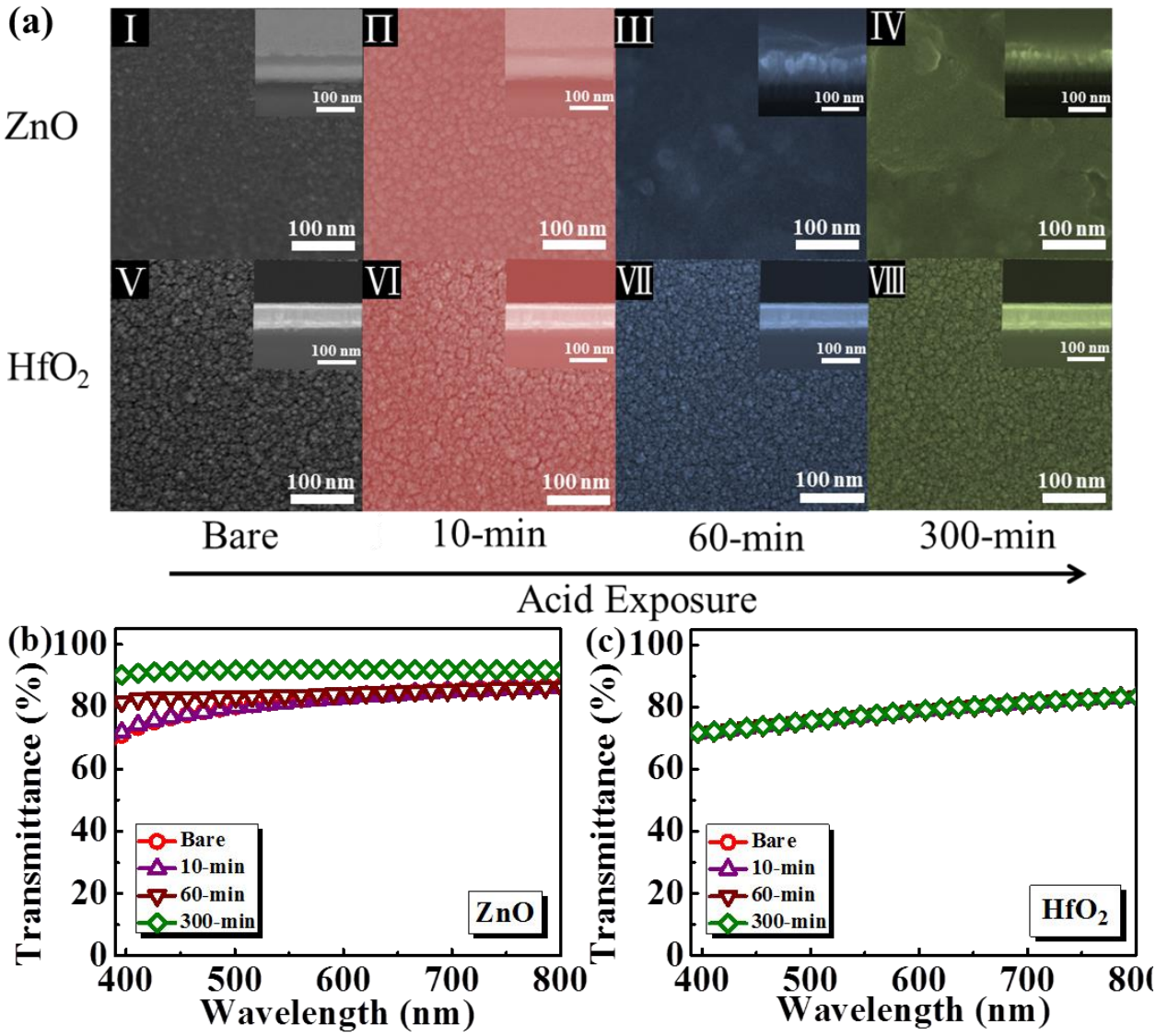

Figure S2. (a) Surface morphologies of (I) pristine ZnO and ZnO with (II) 10-min, (III) 60-min, (IV) 300-min, (V) pristine HfO_2 and HfO_2 with (VI) 10-min, (VII) 60-min, (VIII) 300-min formic acid exposure. The insets in (a) show the cross-sectional SEM images. Transmittance spectra of (b) ZnO and (c) HfO_2 thin films during formic acid exposure.