Supporting Information

NO_2-induced performance enhancement of PEDOT: PSS/Si hybrid solar cells with high efficiency of 13.44%

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Experiments

Other Sample 9 and 11 were fabricated the same as Sample 1-4. In order to make sure whether longer time has the same influence as 40 s, the solar cells have been treated by HNO_3 from 40 s to 110 s. According to the Figure S1, the efficiency of the solar cell decrease after 40 s, which is different from treating time before 40 s.

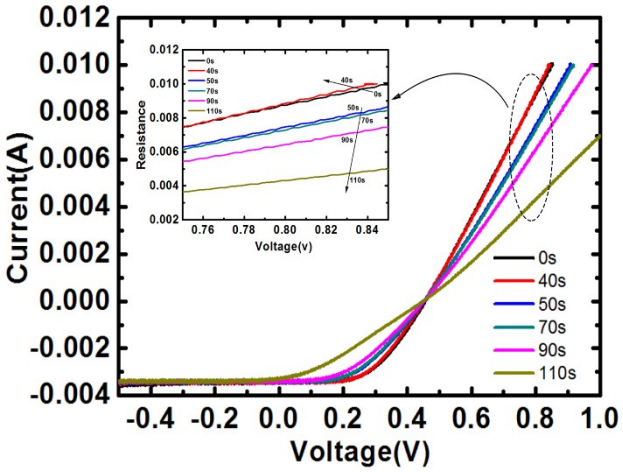

Figure S1. J-V characteristics of the Sample 9 before and after HNO_3 treatment from 40 s to 110 s. The inset shows the enlarged part of the circled J-V curves.

NO_2 Gas-Sensing Test

In order to make a gas sensitive measurement, the substrate was been turn to interdigital electrode on Silicon. Then, the PEDOT: PSS was coated on it. The test was processed in a closed chamber and the figure of the gas test system is shown in Figure S2.

After the sample being placed in the chamber, it was purged by N_2 gas with the concentration of 200 ppm. And then, the sample was exposed in 50 ppm NO_2 gas. The real-time test results are listed in Figure S3.

It is found that the resistance of the PEDOT: PSS would decrease when the NO_2 infused and the change of resistance is about 40%, which makes the efficiency of the solar cells improve about 10%. The end of line shows no longer decrease after NO_2 infusing, which exhibits the similar trend of the solar cells after HNO_3 treatment longer than 40 s. It indicates that the efficiency improvement of the solar cells is related to the NO_2 effect after being treated by HNO_3 vapor.

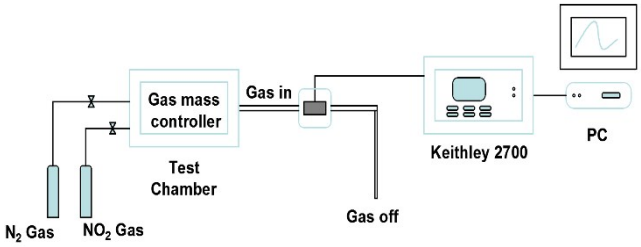

Figure S2. The schematic structure of the gas test system

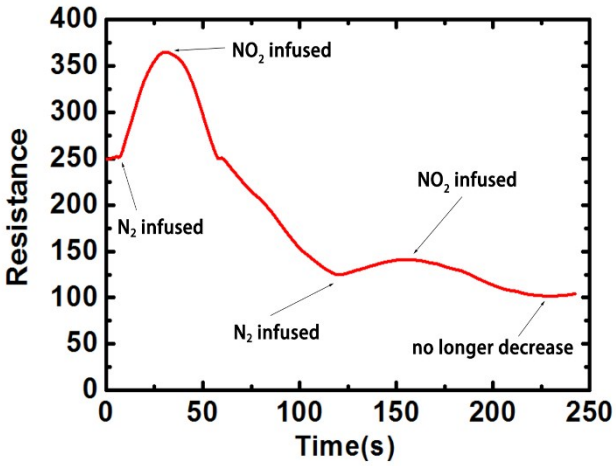

Figure S3. The plot of the resistance change of Sample 10 when exposing in NO_2 or N_2 gas.

Stability measurement

The improvement of HNO_3 treating PEDOT: PSS will gradually degenerate with the time. The stability experiments are made and the results are shown in Figure S4. It is found that the resistance of the solar cell decreases firstly and then increases with the placing time after being treated by HNO_3 vapor, which could also be seen from the curve slope of HNO_3 treated PEDOT: PSS.

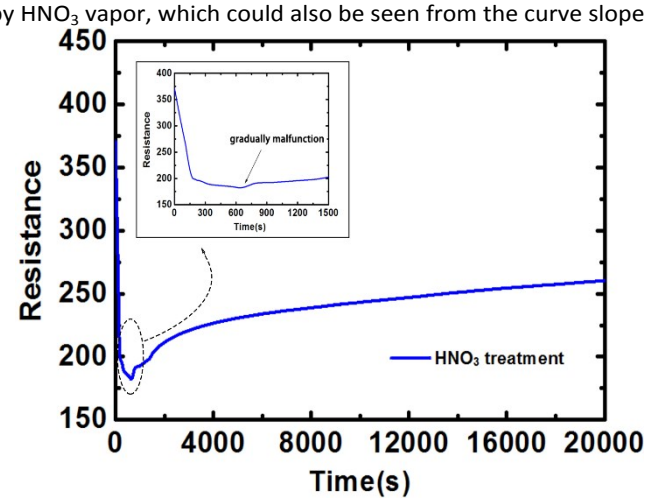

Figure S4. The plots of the resistance change of Sample 11 with HNO_3 vapor treatment. The inset shows the enlarged dotted part of the curve.