Electronic supplementary information

Morphology and electrical properties of inkjet-printed palladium/palladium oxide

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1. Thermogravimetric analysis of the Pd precursor and Pd/PdO mixture.

Fig. S1 shows the TGA curves of Pd precursor and Pd/PdO mixture in N_2. In the first test, the Pd precursor was decomposed inside the TGA furnace (120 ˚C for 4 min and 200 ˚C for 4 min) and heated up to ~950 ˚C. The weight loss was due to the evaporation of the solvent and the decomposition of Pd precursor at ~ 200 ˚C. Metallic Pd was generated in this process. A slight weight loss above 200 ˚C could also be observed, indicating residual organic species remain in the generated Pd.

In the second test, the Pd generated in the first test was cooled down to ~30 ˚C inside the TGA furnace with N_2 purge. Then, the furnace was heated up to ~950 ˚C again. In this process, almost no weight change could be observed, suggesting that PdO was not generated inside N_2.

In the third test, Pd was generated by precursor thermolysis in a chamber filled with N_2. Then, the generated Pd was transported to the TGA furnace in air, followed by heating up to ~950 ˚C. In this case, the weight loss below 500 ˚C was due to the decomposition of remaining ligand. The weight increase was due to the oxygen uptake in air, forming PdO. And the weight loss at ~700 ˚C was due to the decomposition of PdO to Pd.

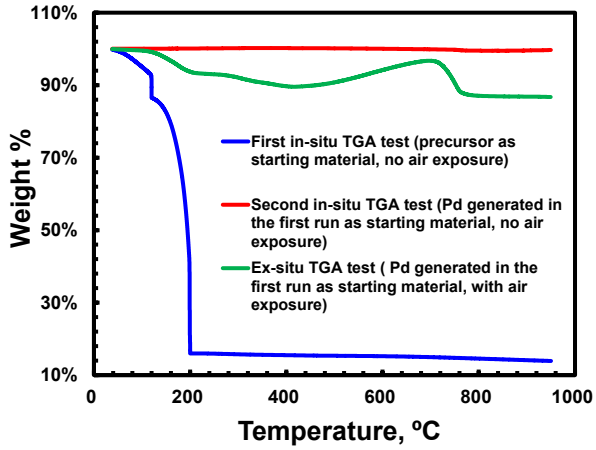

Fig. S1 TGA curves of Pd precursor and Pd/PdO mixture.

2. Temperature cycling tests of different Pd/PdO films in humid air (RH = 50%).

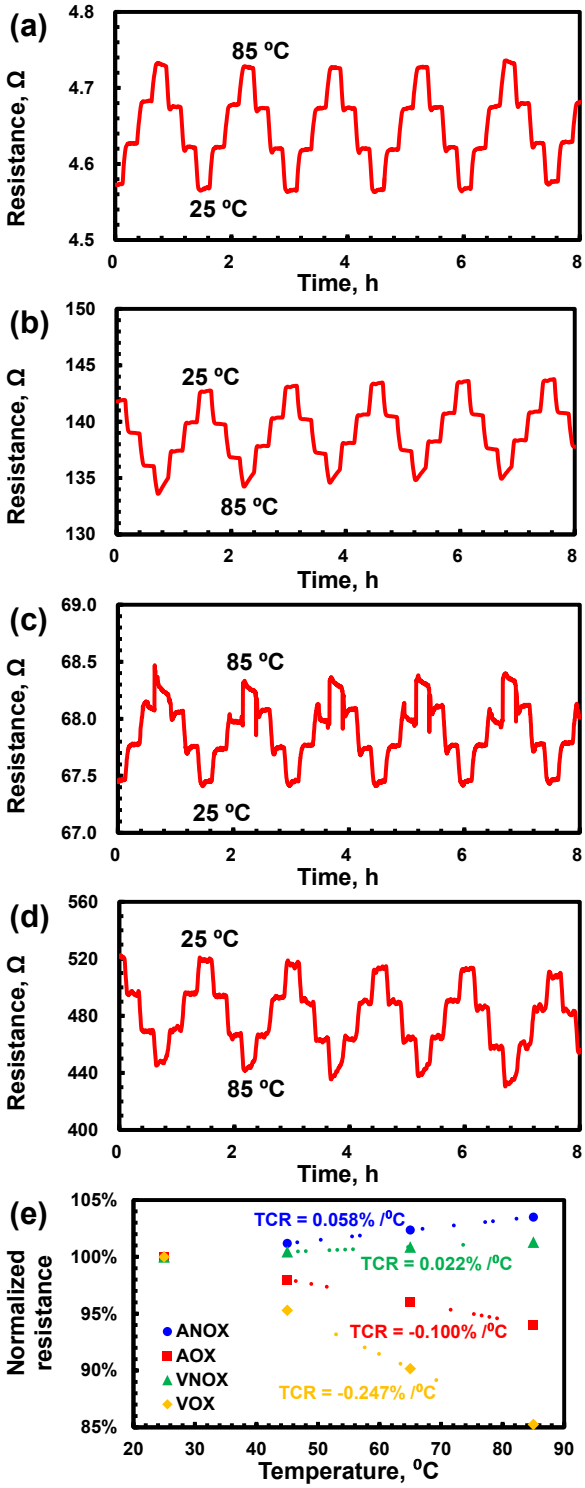

Fig. S2 Resistance change during temperature cycling tests of Pd/PdO films prepared (a) in air before oxidation (ANOX), (b) in air after oxidation (AOX), (c) in low vacuum before oxidation (VNOX), and (d) in low vacuum after oxidation (VOX). (e) Temperature dependence of resistance in humid air for the 4 samples for TCR calculation.