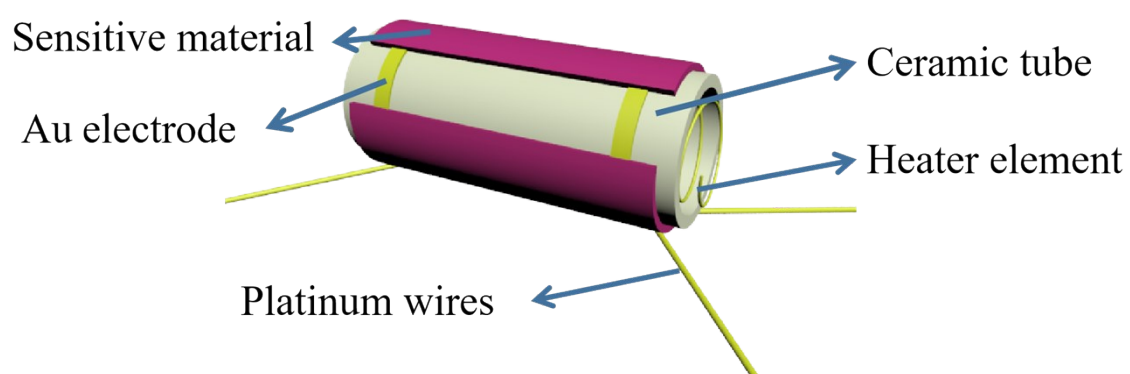
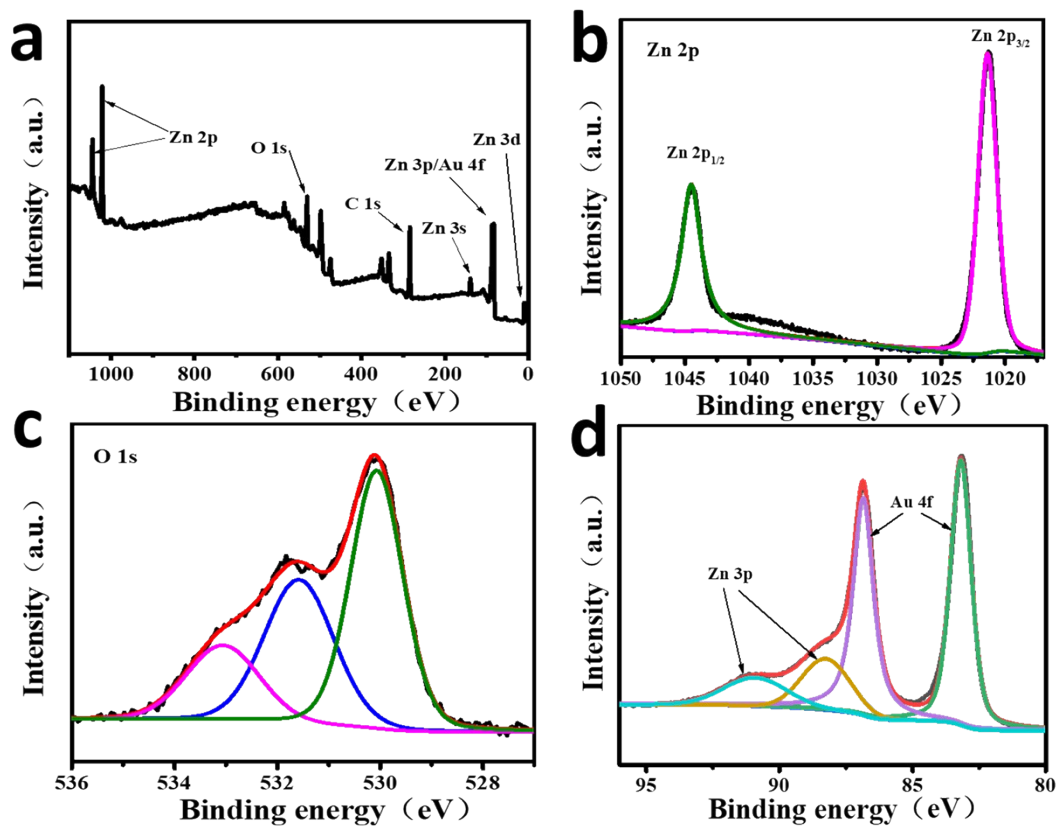


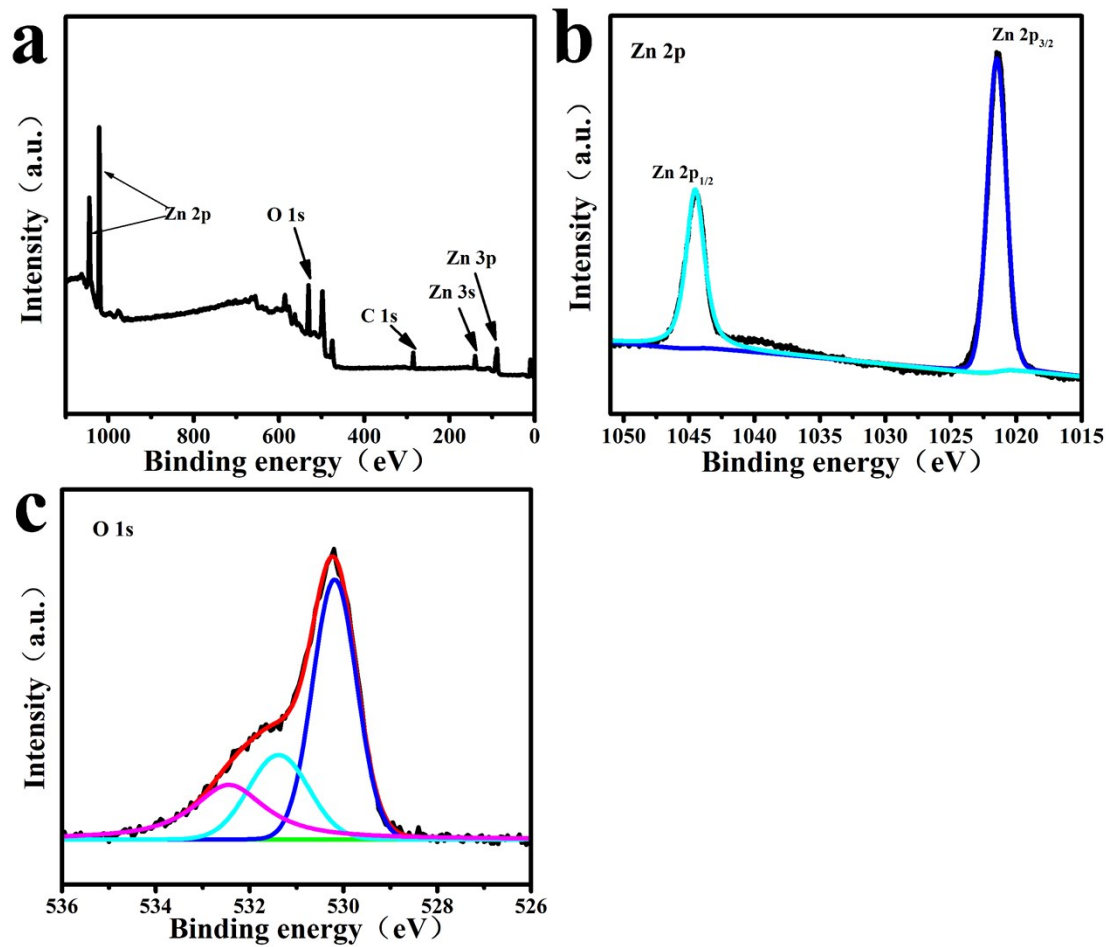
**Supplementary Information**  
**Of**  
**Design of size-controlled Au nanoparticles loaded on the surface of**  
**ZnO for ethanol detection**



**Fig. S1.** Sensor structure.



**Fig. S2.** Survey (a), Zn 2p (b), O 1s (c) and Au 4f (d) XPS spectra of ZnO-Au -000 sample.



**Fig. S3.** Survey (a), Zn 2p (b) and O 1s (c) XPS spectra of original sample.

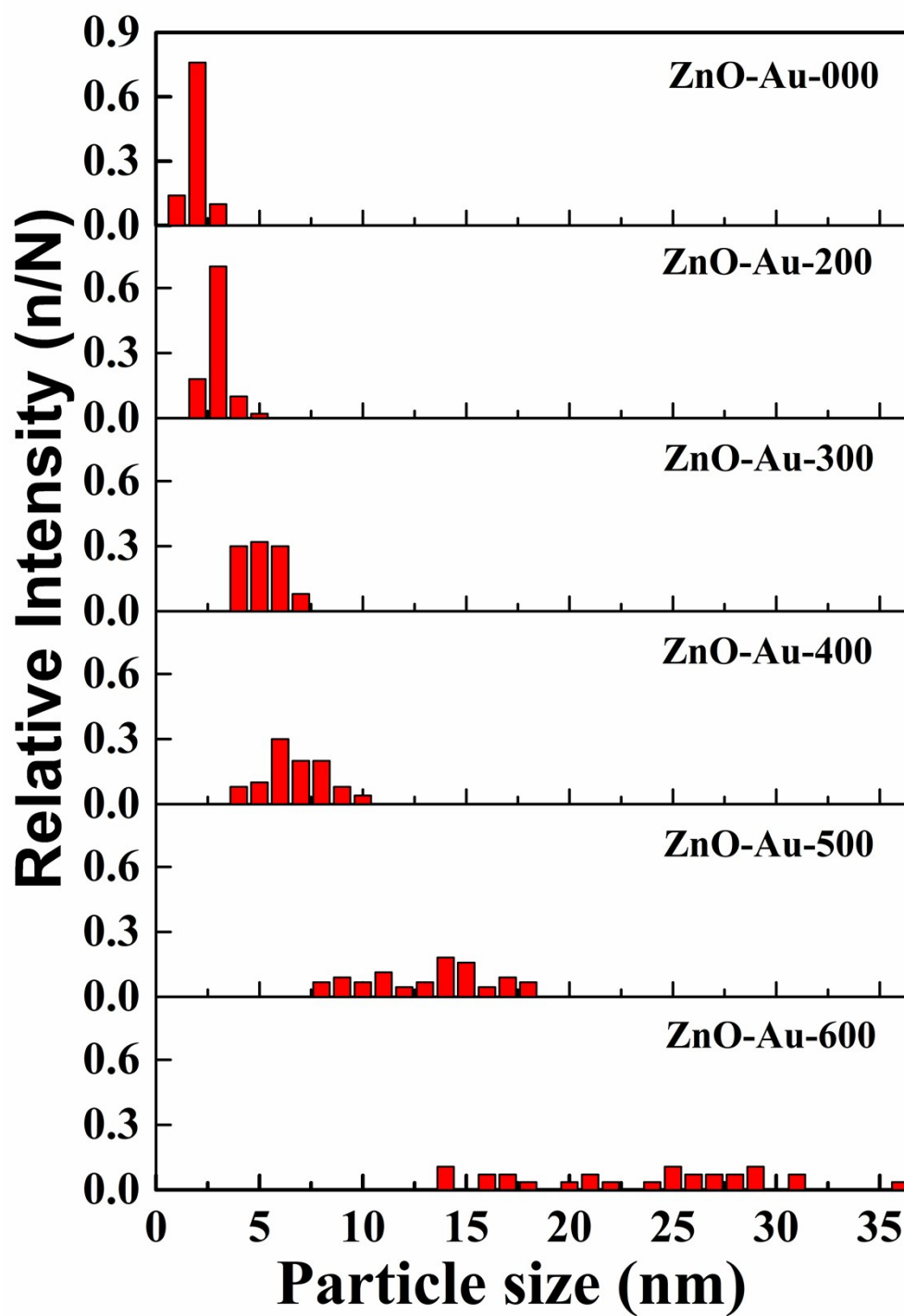
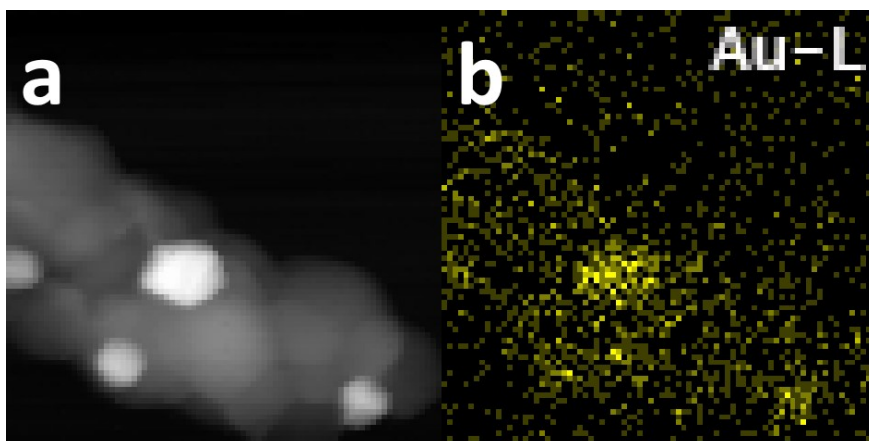
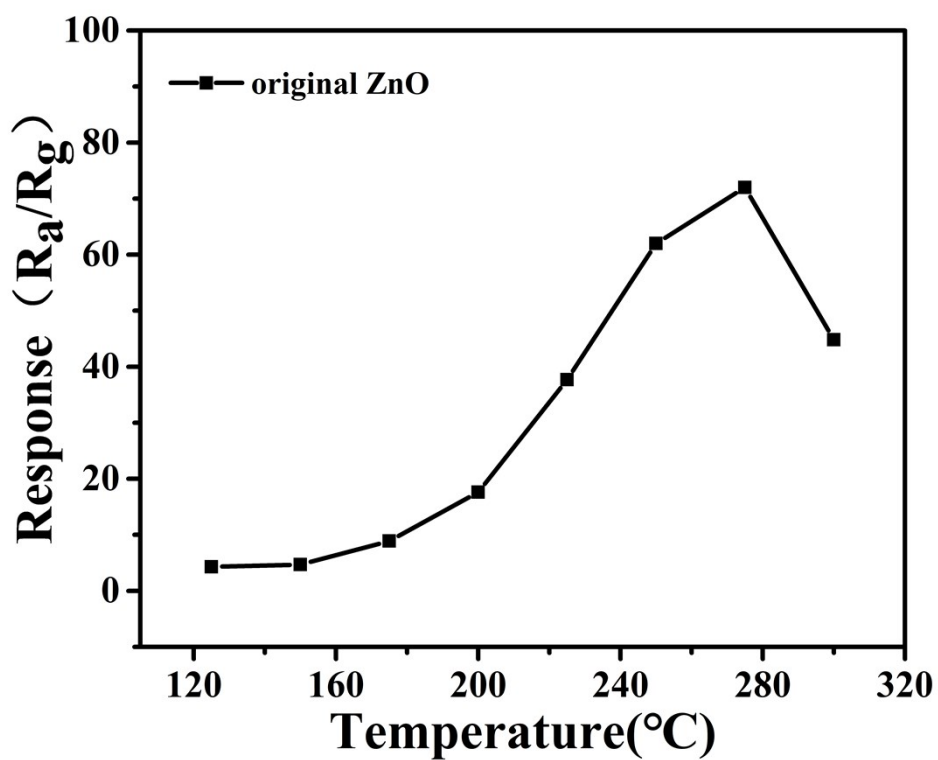


Fig. S4. Au particle size distribution of sample ZnO-Au-000 to ZnO-Au-600.



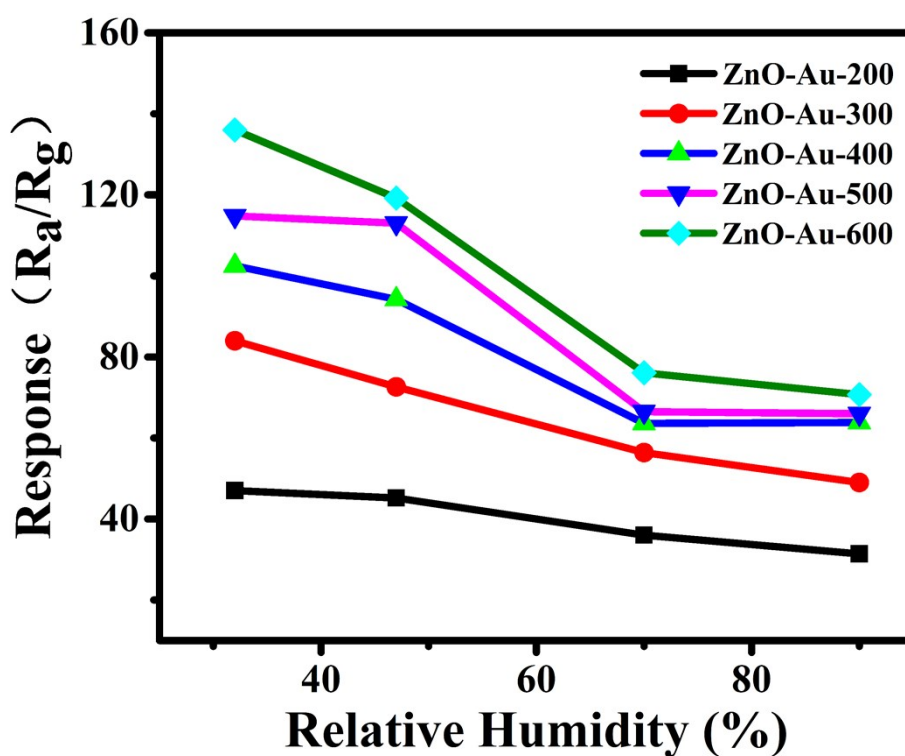
**Fig. S5.** (a) HAADF-STEM image of the sample ZnO-Au-600; (b) corresponding Au elemental maps of the selected area, respectively.



**Fig. S6** Response of pure ZnO NWs sensor to the test temperature in 100 ppm ethanol.

Sample	Best Response (50ppm)	Optimum Temperature (°C)
original ZnO	65.1 (100ppm)	275°C
ZnO-Au-000	11.9	—
ZnO-Au-200	108.2	125°C
ZnO-Au-300	96.1	175°C
ZnO-Au-400	123.2	175°C
ZnO-Au-500	133.3	175°C
ZnO-Au-600	151.8	200°C

**Tab. S1.** The best response value and Optimum Temperature of different sensors in 100 ppm ethanol.



**Fig. S7** Relationship between response and relative humidity at 175 °C in 50ppm ethanol.

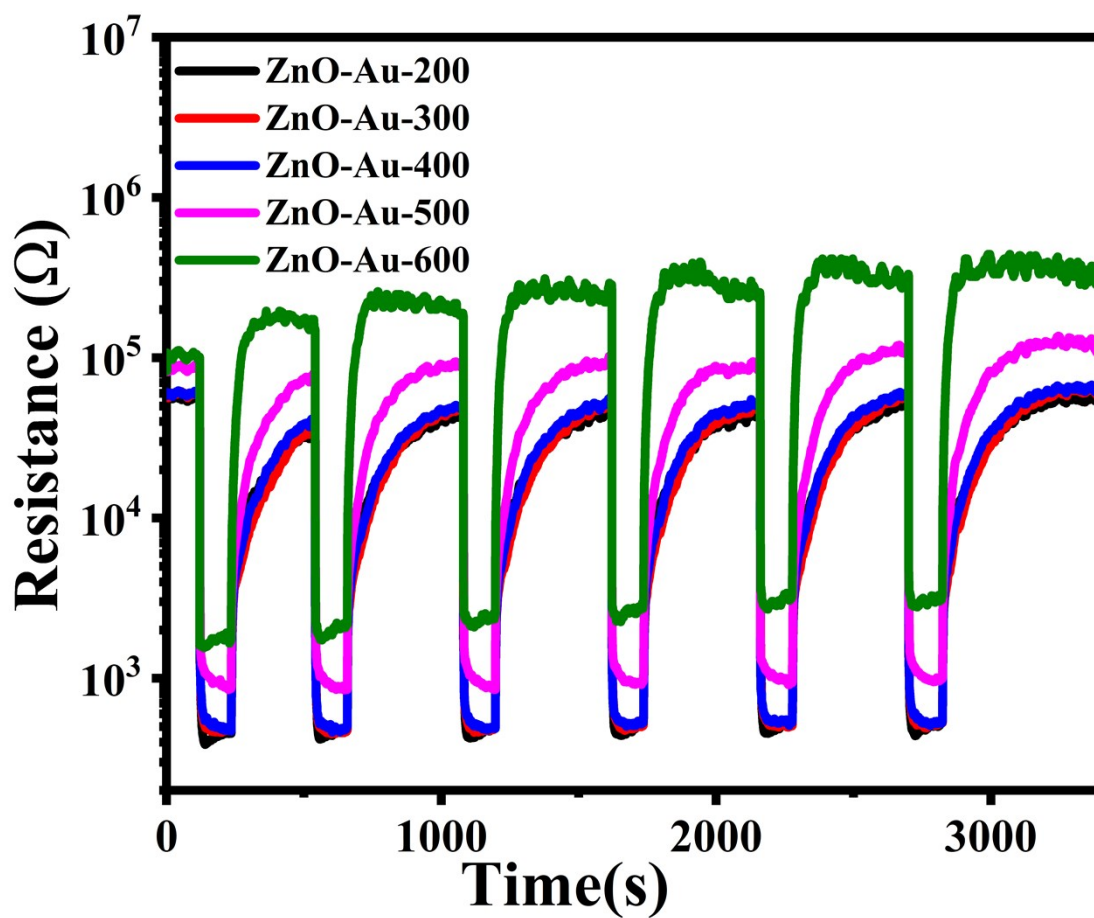


Fig. S8 The resistance reproducibility of ZnO-Au-500 sensor upon 6-cycle tests to 50 ppm ethanol at 175°C.