# Supporting information for

# A novel structure of sensitivity enhancement for gas sensors —— $\alpha$-$Fe_2O_3$ nanoropes containing large amount of grain boundaries and their excellent ethanol sensing performance

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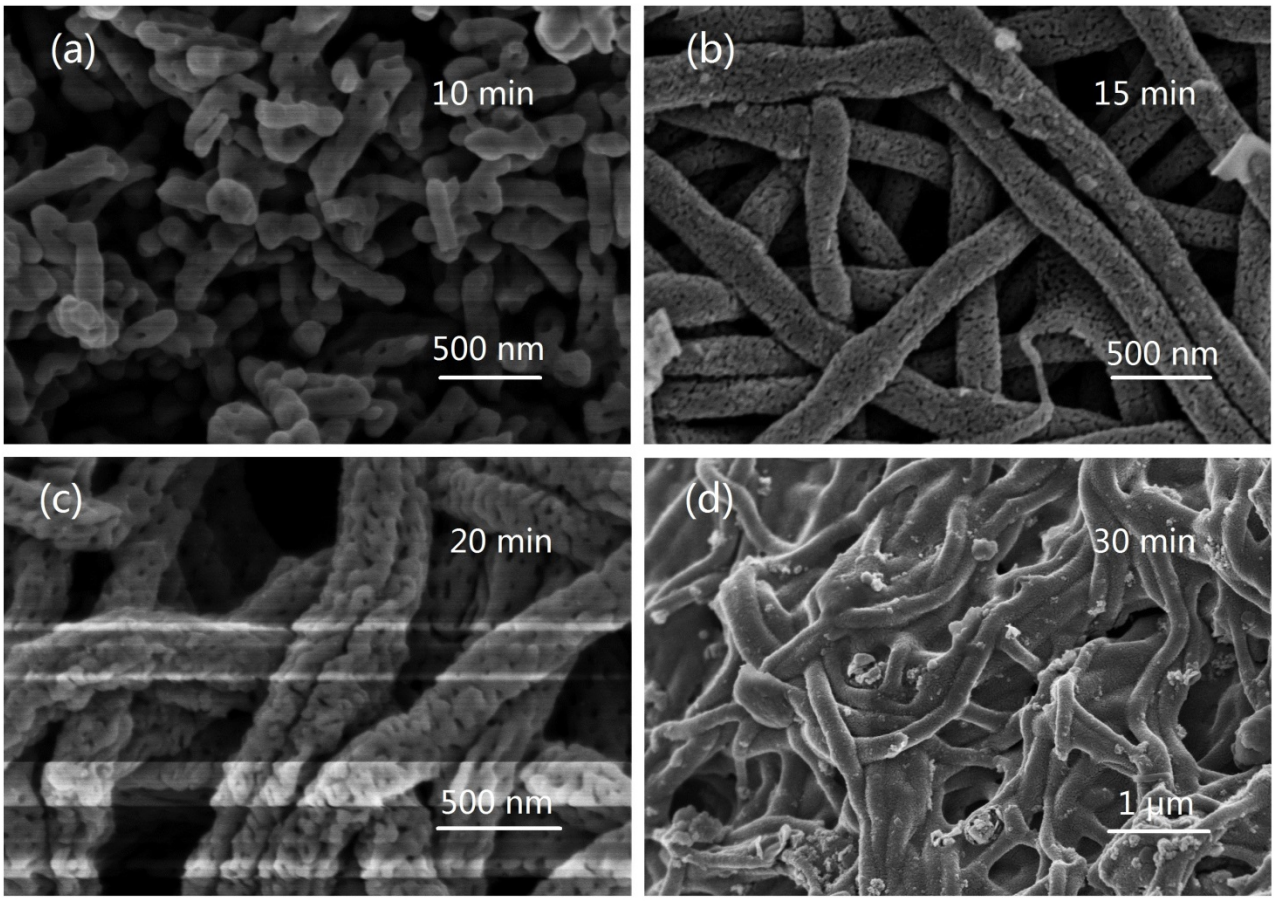


Figure S1. SEM images of $Fe_2O_3$ nanofibers calcined at 600℃ in air from the precursor of A-PAN-Fe with the different immersion time (a) 10 min, (b) 15 min, (c) 20 min and (d) 30 min.

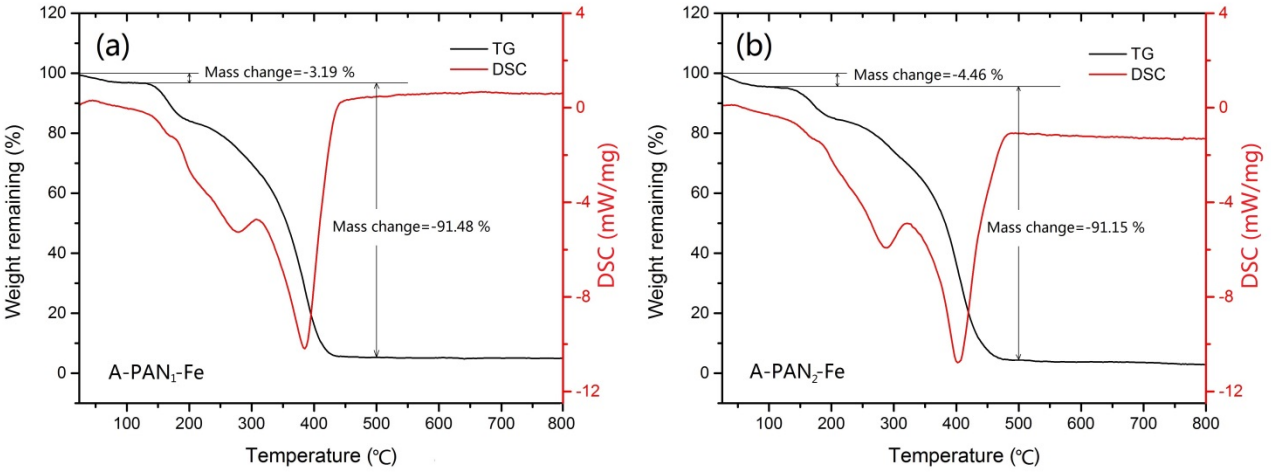


Figure S2. TG-DSC analysis of the (a) A-$PAN_1$-Fe and (b) A-$PAN_2$-Fe.

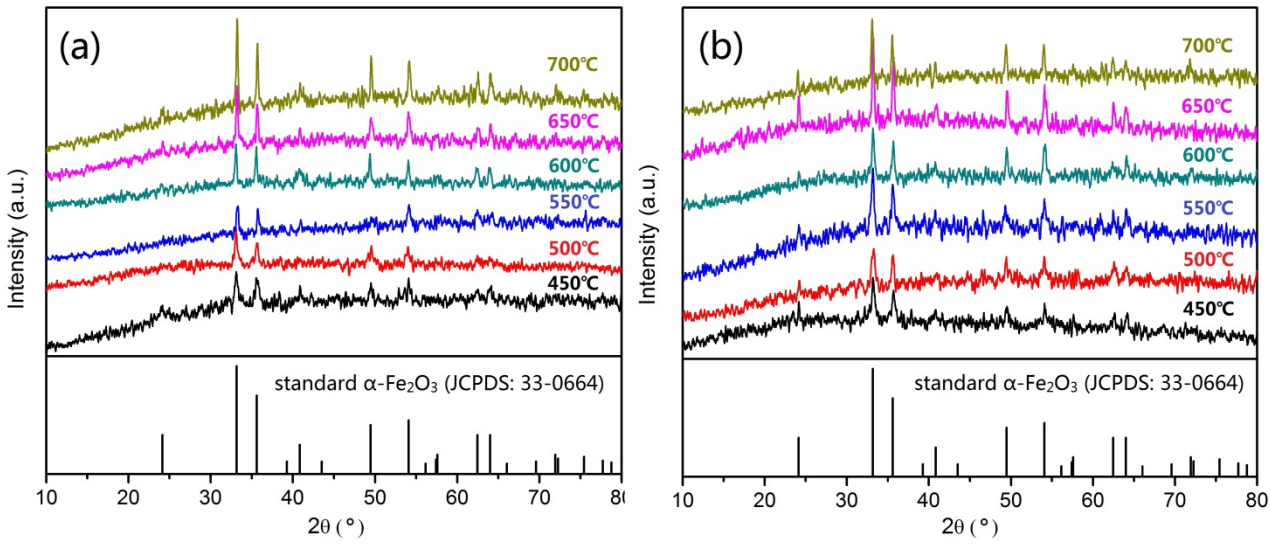


Fig. S3 XRD diffraction patterns of samples calcined at various temperatures (450, 500, 550, 600, 650 and 700 ℃) from (a) A-$PAN_1$-Fe and (b) A-$PAN_2$-Fe compared to the standard pattern of α-$Fe_2O_3$.

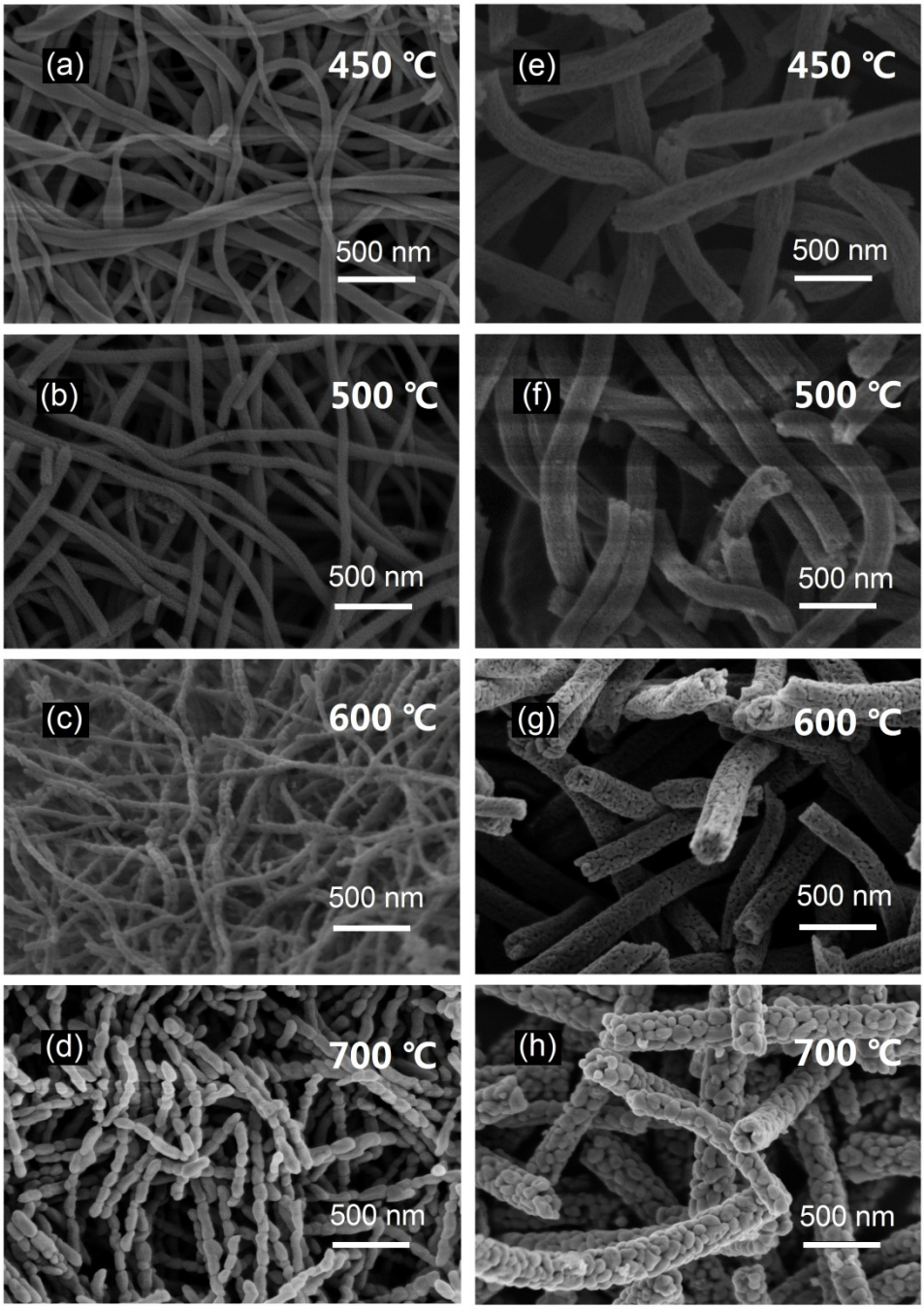


Figure S4. SEM images of the α-$Fe_2O_3$ nanostrings (a-d) and nanoropes (e-h) after calcination at various temperatures from 450-700 ℃for 1 h in air.

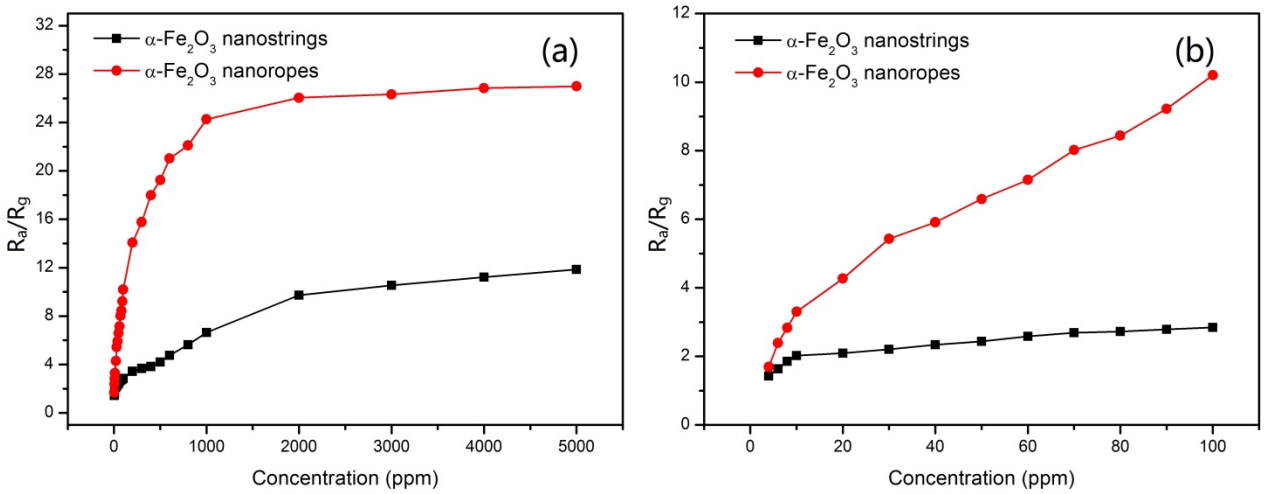


Figure S5. Response of α-$Fe_2O_3$ nanostrings and nanoropes to different concentrations of $C_2H_5OH$ (a) 4-5000 ppm and (b) 4-100 ppm at 240 ℃.

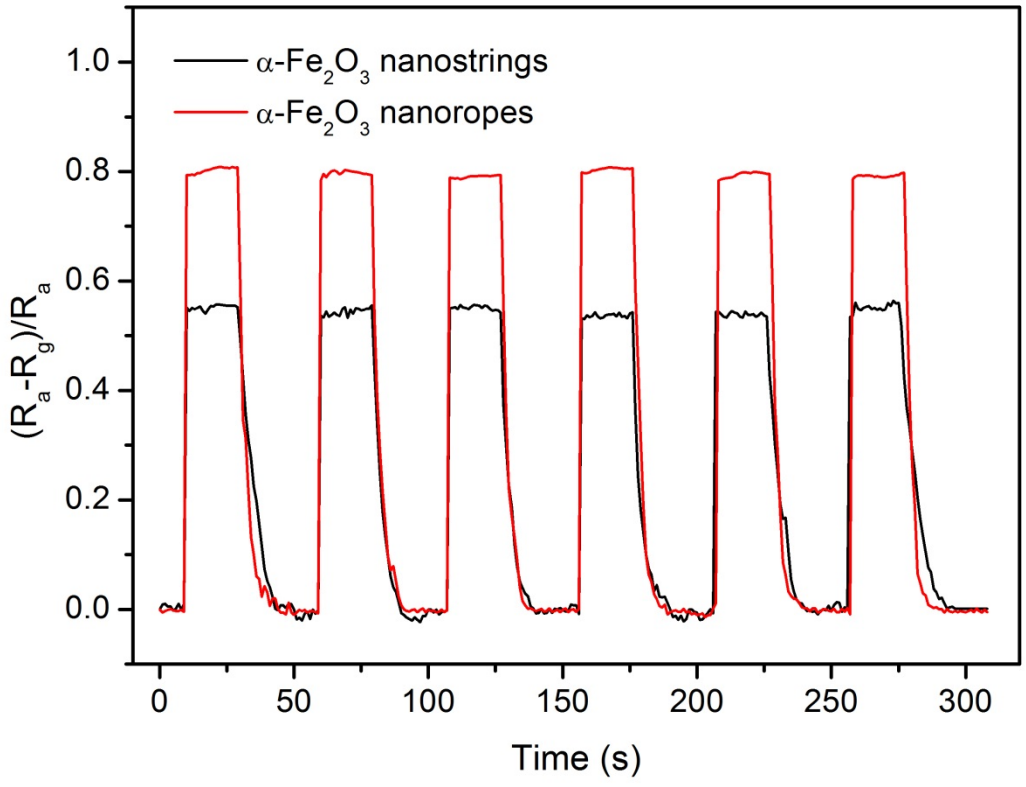


Figure S6. Cyclic sensing and recovery performance of α-$Fe_2O_3$ nanostrings and nanoropes to 100 ppm $C_2H_5OH$ at 260 ℃.