

Supporting information for

Silicon photoanode for efficient ethanol oxidation under alkaline condition

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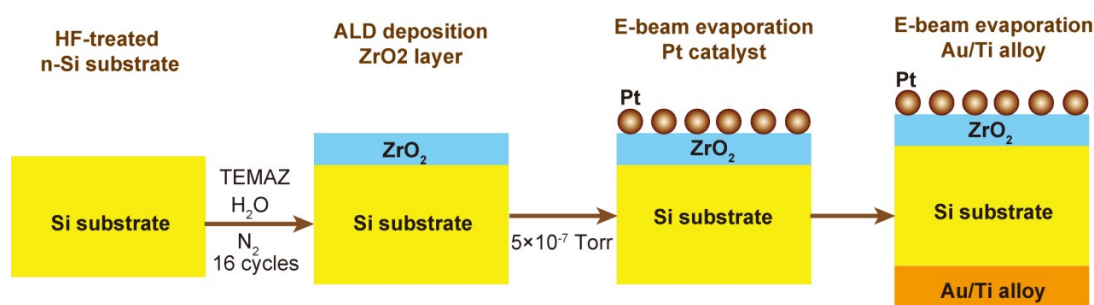


Fig. S1 Representation of the fabrication of Pt/ZrO₂/n-Si electrode by CMOS technology.

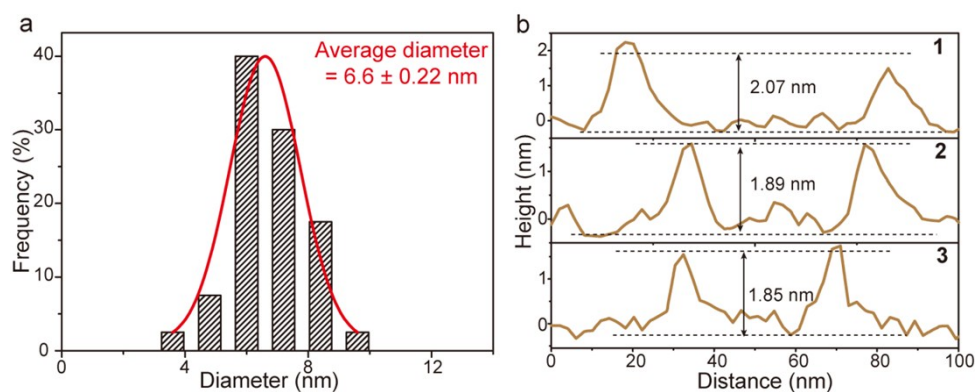


Fig. S2 The size distribution histogram of Au nanoparticles based on 50 particles from the high-magnification image of TEM. The corresponding height profiles of Pt catalysts. The numbers from 1 to 3 correspond to three different zones in Fig. 1b.

The average size of Pt nanoparticles can be acquired from the size distribution histogram (Fig. S2) based on 40 particles from the AFM image (Fig. 1). The size basically presents the Gauss normal distribution, which is 6.6 nm with the standard error of 0.22. Besides, the height profile demonstrated that the thickness of Pt nanoparticles is about 1.94 nm, which is according with the thickness of ALD deposition.

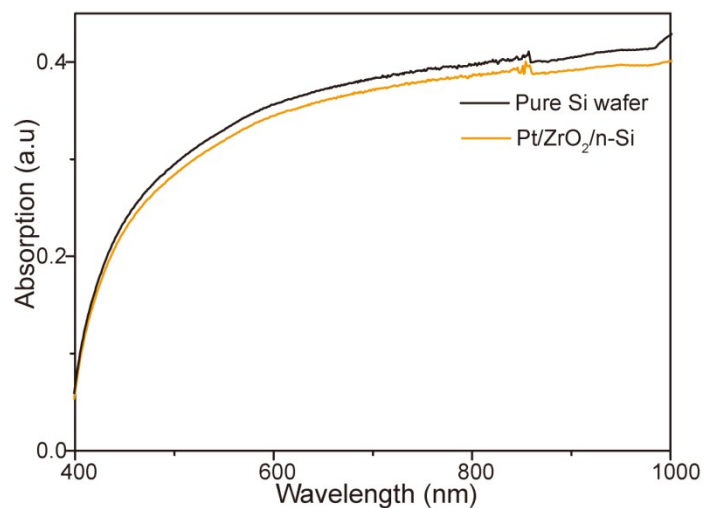


Fig. S3 UV-Vis spectra of pure Si substrate and Pt/ZrO₂/n-Si electrode.

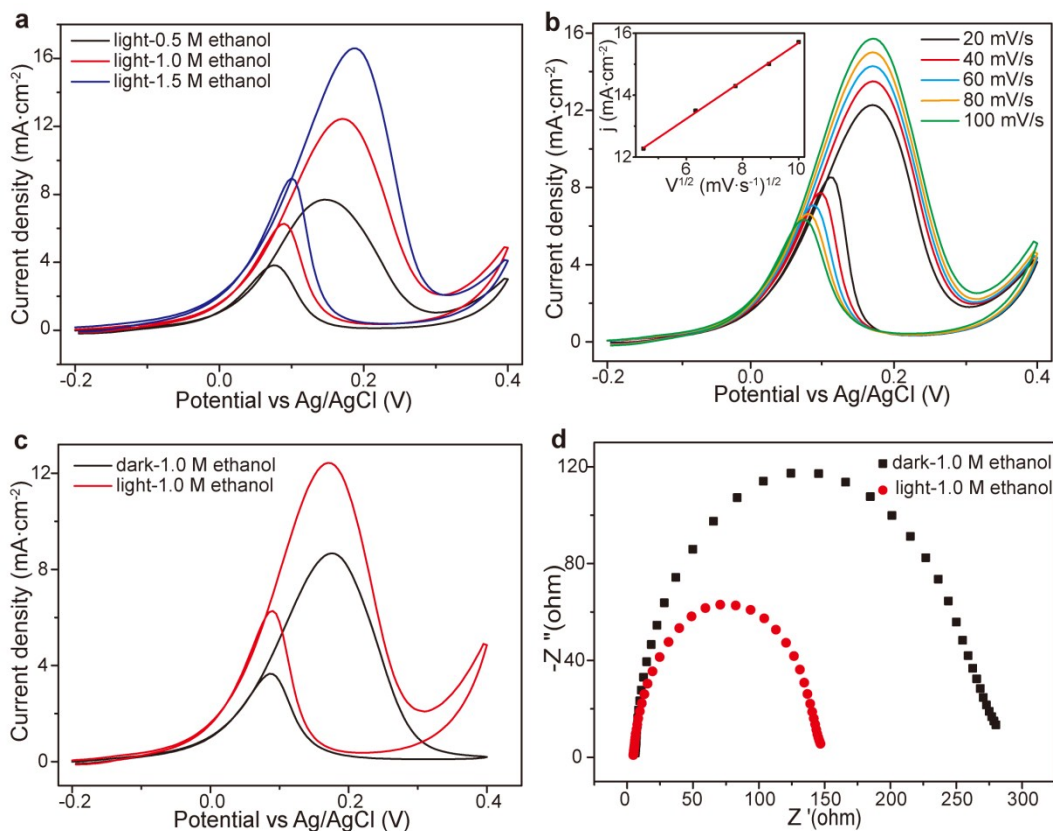


Fig. S4. a) CVs of Pd/ZrO₂/n-Si electrode in 1.0 M KOH with different ethanol concentration. b) CVs of Pt/ZrO₂/n-Si electrode in 1.0 M KOH and 1.0 M ethanol at different scan rates. Inset of b shows a linear relationship of current density with the square root of scan rate. c) CVs of Pd/ZrO₂/n-Si electrode in 1.0 M KOH containing 1.0 M ethanol with (red line) and without (black line) visible light illumination. d) the corresponding Nyquist plots with c

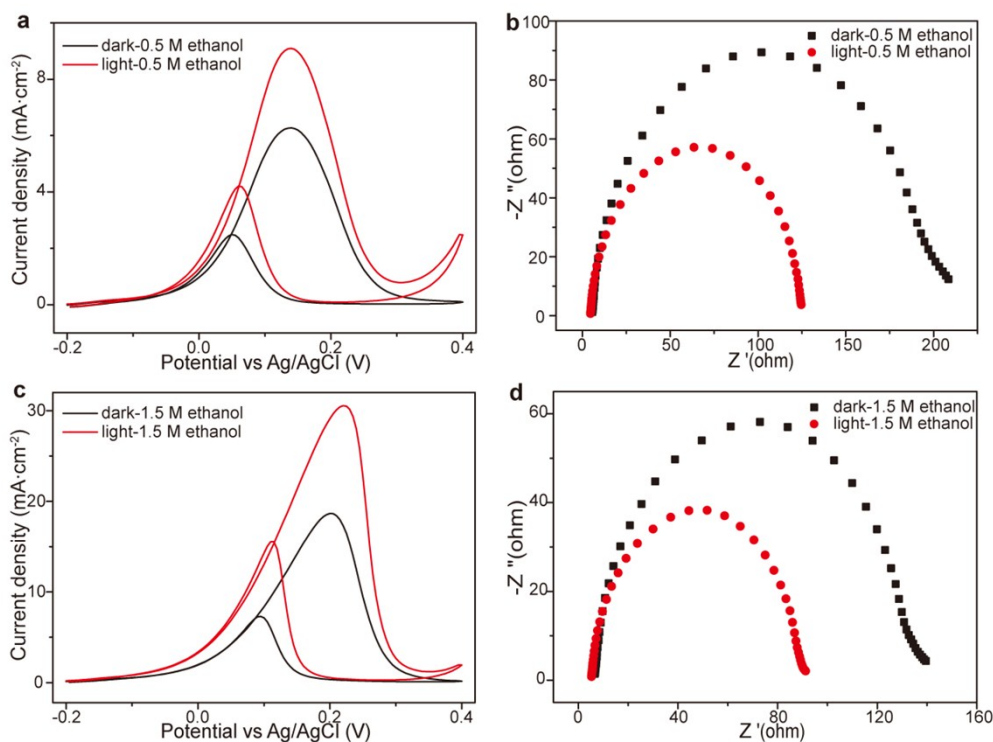


Fig. S5 CVs (a) and the corresponding Nyquist plots (b) of Pt/ZrO₂/n-Si electrode in 1.0 M KOH containing 0.5 M ethanol with (red line) and without (black line) visible light illumination; CVs (c) and the corresponding Nyquist plots (d) of Pt/ZrO₂/n-Si electrode in 1.0 M KOH containing 1.5 M ethanol with (red line) and without (black line) visible light illumination.

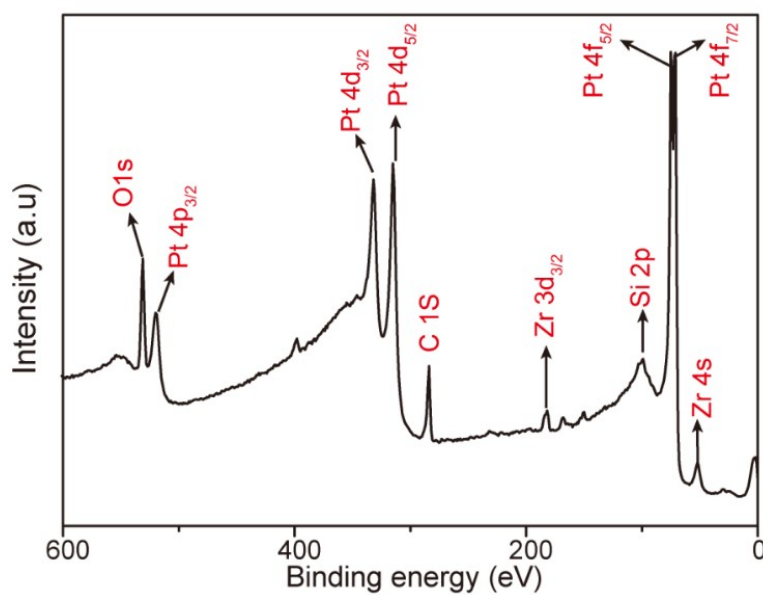


Fig. S6 The Representative XPS survey spectrum of Pt/ZrO₂/n-Si photoanode.