Supporting Information

Hydrogenation/oxidation triggered highly efficient reversible color switching of organic molecules

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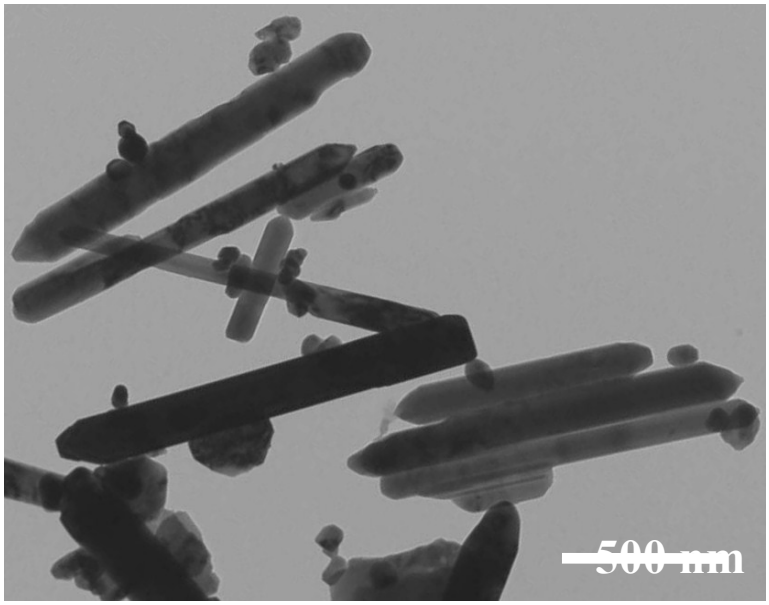


Fig. S1 TEM image of obtained ZnO_{1-x} nanorods.

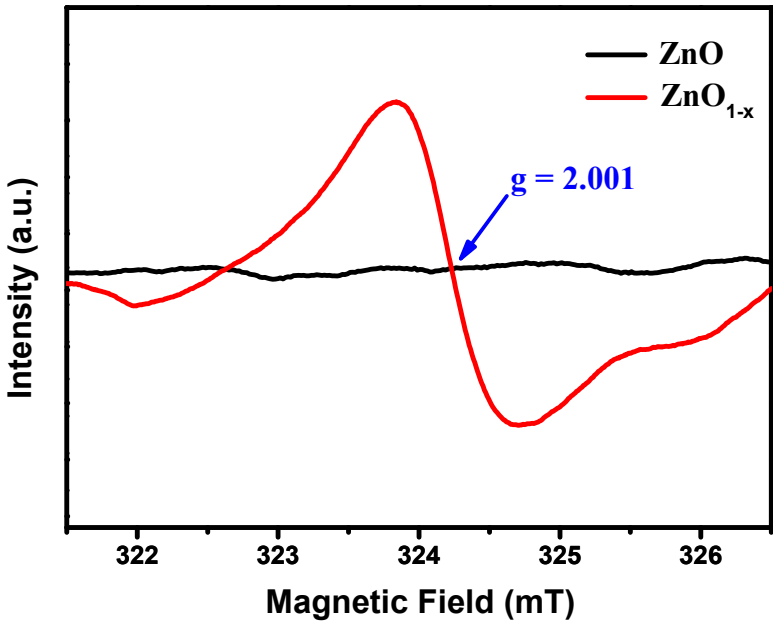


Fig. S2 The X-band EPR spectra of the ZnO_{1-x} nanorods and commercial ZnO sample recorded at T = 140 K.

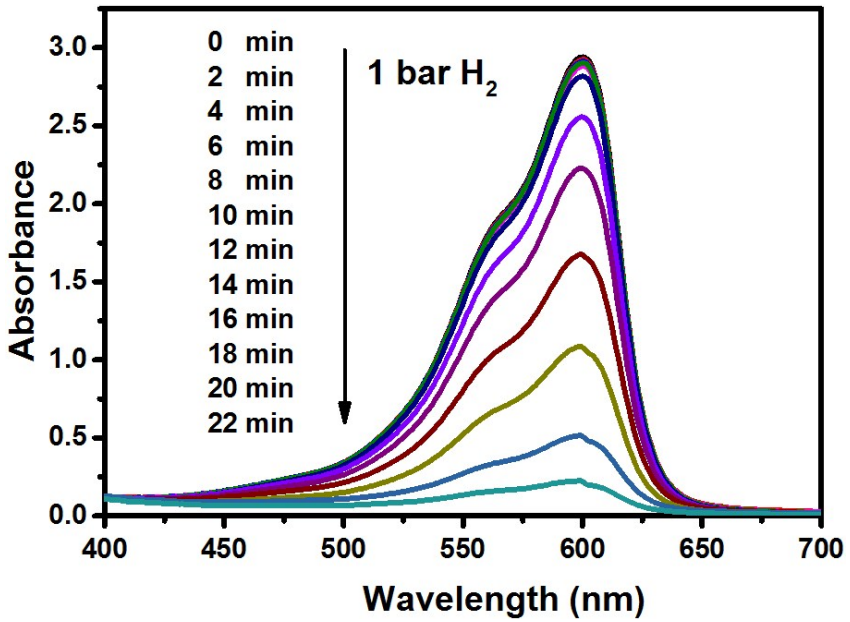


Fig. S3 UV-vis spectra of Pd-ZnO (commercial ZnO without oxygen vacancies) showing the hydrogenation process under 1 bar H_2 and room temperature.

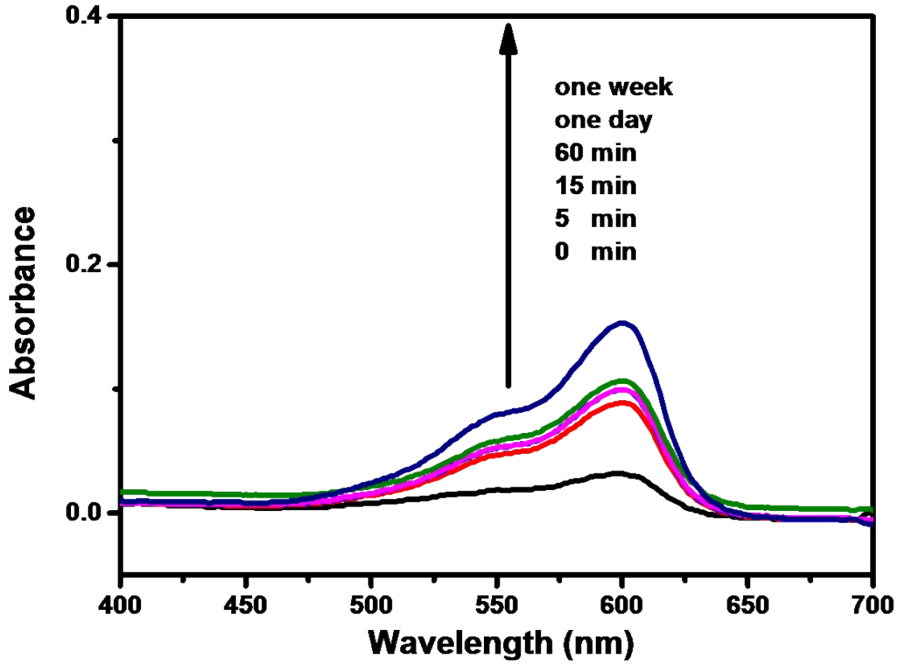


Fig. S4 The UV-vis spectra of HEC stabilized LTH solution after catalyst removed exposing to air for different time.

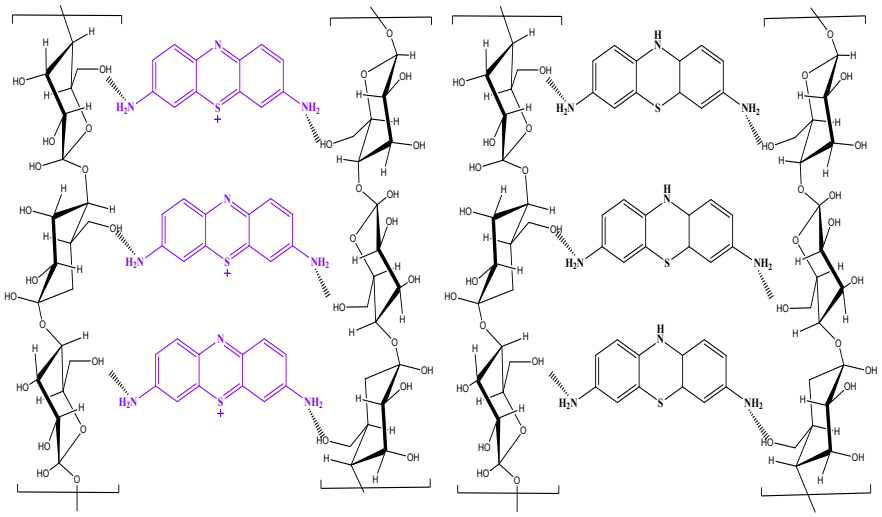


Fig. S5 Illustration of HEC stabilized of TH^+ and LTH.

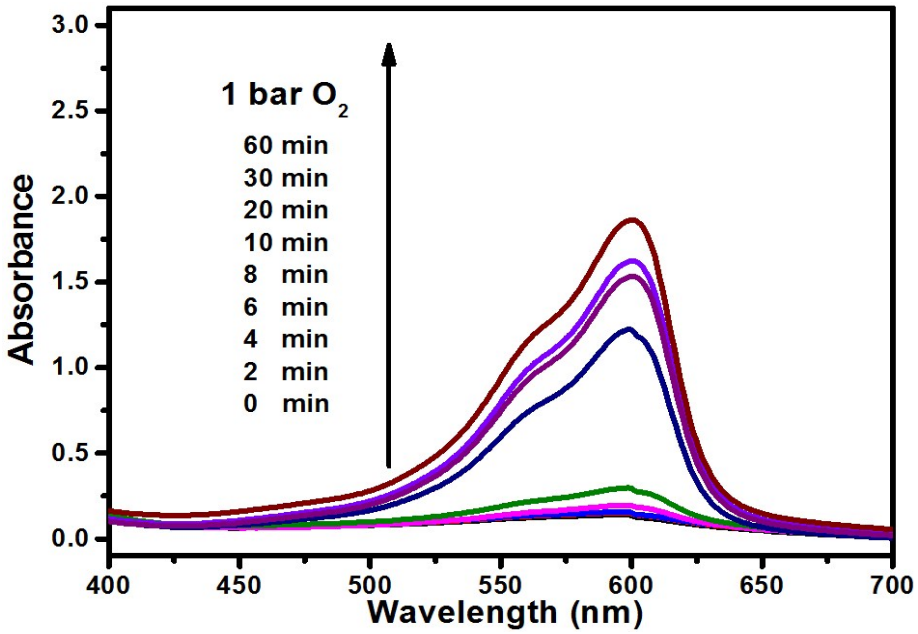


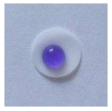
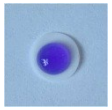
Fig. S6 UV-vis spectra of Pd-ZnO (commercial ZnO without oxygen vacancies) showing the oxidative dehydrogenation process under 1 bar O_2 and room temperature.

Table 1 The switching behavior change with the concentration of Pd-ZnO_{1-x}

Entry	Amounts of Pd-ZnO_{1-x} (mg)	Time of color fading (min)	Time of color recovery (min)
1	0.125	2.8	4.2
2	0.25	2.2	3.3
3	0.5	2.1	3.1

Reaction condition: various amounts of 1 wt% Pd-ZnO_{1-x} catalyst, 30 μL TH^+/HEC/Pd-ZnO_{1-x} mixture for one drop, 1 bar H_2/O_2.

Table 2 The switching behavior change with the drop volume of TH^+/HEC/Pd-ZnO_{1-x} mixture.

Volume of drop (μL)	Purple color (TH^+)	Colorless leuco-thionin (LTH)	Time of color fading (min)	Time of color recovery (min)
10			1.5	2.1
30			2.2	3.3
50			5.3	7.2
100			8.8	10.2

Reaction condition: 0.25 mg of 1 wt% Pd-ZnO_{1-x} catalyst, different drop volume of TH^+/HEC/Pd-ZnO_{1-x} mixture, 1 bar H_2/O_2.