Electronic Supplementary

Nanoporous ZnO nanostructure synthesis by a facile method for superior sensitive ethanol sensor applications

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Figure S 1. A photo of precipitated product, and details about the calculation of the yield of material.

- Chemical reaction: $5\text{Zn(NO}_3\text{)}_2 + 2\text{Na}_2\text{CO}_3 + 6\text{H}_2\text{O} = \text{C}_2\text{H}_6\text{O}_{12}\text{Zn}_5 + 4\text{NaNO}_3 + 6\text{HNO}_3$
- Mol of zinc nitrate, $\text{Zn(NO}_3\text{)}_2$ used in this work (50 ml, 1M) $\rightarrow n_{\text{Zn}^{2+}} = 50 \text{ mmol}$.
- Mol of sodium carbonate, $\text{Na}_2\text{CO}_3$ used in this work (10 mL of 1 M) $\rightarrow n_{\text{Na}_2\text{CO}_3} = 10 \text{ mmol}$.
- If assumed that 100% zinc nitrate was transferred into Hydrozincite $\rightarrow$ mol of hydrozincite: $n=50/5=10 \text{ mmol} \rightarrow$ Weight of Hydrozincite (M=548.96 g/mol) theoretically calculated based on zinc nitrate used: $m=10 \times 548.96 \text{ (mg)} = 5489.6 \text{ mg} = 5.489 \text{ g}$
- However, the amount of $\text{Na}_2\text{CO}_3$ used in this work is much less than the requirement amount for the reaction, thus the $\text{Zn(NO}_3\text{)}_2$ remains in the reaction. Therefore, we calculated the yield of Hydrozincite over the sodium carbonate. With assumption that 100% of $\text{Na}_2\text{CO}_3$ was reacted, thus weight of Hydrozincite theoretically calculated based on sodium carbonate used is: $m=5 \times 548.96 \text{ (mg)} = 2.74 \text{ g}$
- Weight of Hydrozincite obtained in our experiment: ~2.6 g
- Yield of over the is $=2.6/2.74 \approx 94\%$ of sodium carbonate used.
The average crystalline size calculated by Scherrer equation using the (101) peak is 16.1, 25.1, 31.0, and 35.9 nm, respectively.
Figure S3. SEM images of ZnO heat treated at different temperatures: (A) 400, (B) 500, (C) 600, and (D) 700°C.
Figure S4. (A) Nitrogen adsorption/desorption isotherm of the ZnO nanostructures calcinated at 400°C; and (B) pore size distribution.