

**Supporting information for**

**Preparation of ZnO/TiO<sub>2</sub> and its catalytic performance in  
the synthesis of polycarbonate diol**

*Ran Chong,<sup>a</sup> Fei Qian,<sup>b</sup> Zhong-Hua Sun,<sup>\*a</sup> Mei-Jun Wei,<sup>a</sup> Wei-You Zhou,<sup>a</sup> Jing  
Zhang,<sup>a</sup> Ming-Yang He,<sup>a</sup> Qun Chen,<sup>a</sup> and Jun-Feng Qian<sup>\*a</sup>*

*<sup>a</sup>Jiangsu Key Laboratory of Advanced Catalytic Materials and Technology, Advanced  
Catalysis and Green Manufacturing Collaborative Innovation Center, Changzhou  
University, Changzhou 213164, P. R. China*

*<sup>b</sup>Jiangsu Lingfei Chemical Co., LTD. Wuxi 214264, China*

*\*Corresponding authors. Email: sunzhonghua@cczu.edu.cn (Z.H.S.) and  
qianjunfeng@cczu.edu.cn (J.F.Q.).*

## 1. Experimental details

### 1.1 GC-FID analysis

GC-FID is used to analyze the content of by-product tetrahydrofuran. Firstly, the peak position of pure tetrahydrofuran is measured, and then the 'distillate oil' is measured, which is quantified according to the peak area of tetrahydrofuran in distillate oil. The Injection temperature is 320 °C. Chromatographic column type: Agilent HP-5, Length: 30 m, Diam: 0.32 mm, Film: 0.25  $\mu\text{m}$ . Injection volume :1  $\mu\text{L}$ . Heating rate: initial value 60 °C, keep 5 min, heating rate 20 °C/min, rise to 320 °C, keep 15 min.

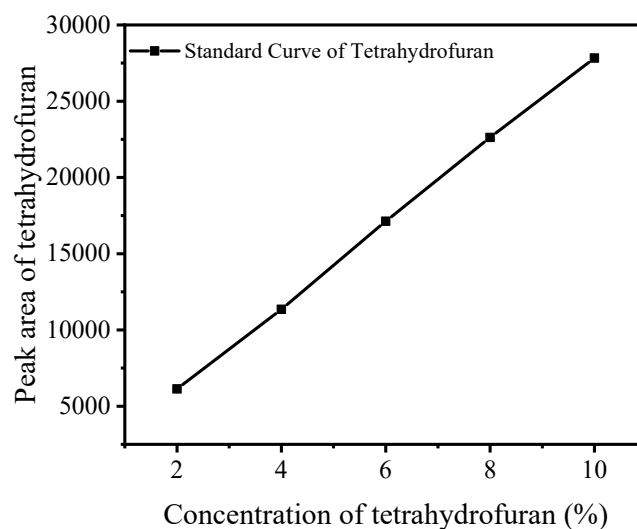


Fig. S1 Standard Curve of Tetrahydrofuran

### 1.2 XRD analysis of the reused catalyst

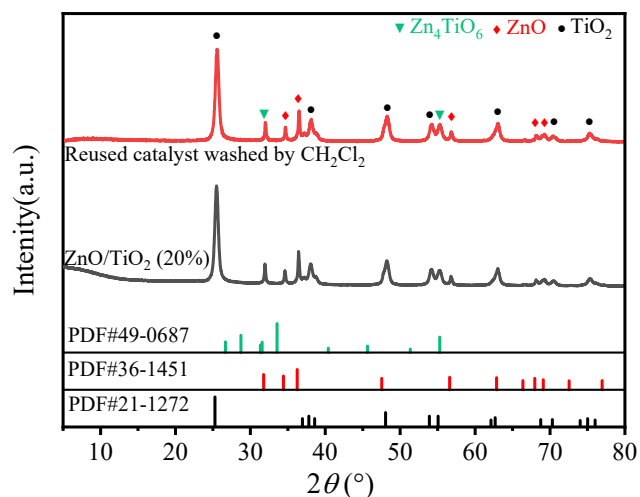


Fig. S2 XRD pattern of ZnO/TiO<sub>2</sub> (20%) with as-synthesized and after runs

Fig. S2 shows the XRD patterns of the fresh and the catalyst washed with

dichloromethane after recovery, indicating that the catalyst still retained the original structure after four times run and the structure of the catalyst did not change obviously.

## 2. Characterization of PCDL

TiO<sub>2</sub>/SiO<sub>2</sub> catalyst prepared by dropping A into B and n(TiO<sub>2</sub>): n(SiO<sub>2</sub>) = 3:1 was used in the reaction. The PCDL prepared at 200 °C, 0.3 wt % catalyst amount, and DPC: BDO= 1: 1.1 was analyzed by FTIR and <sup>1</sup>H NMR.

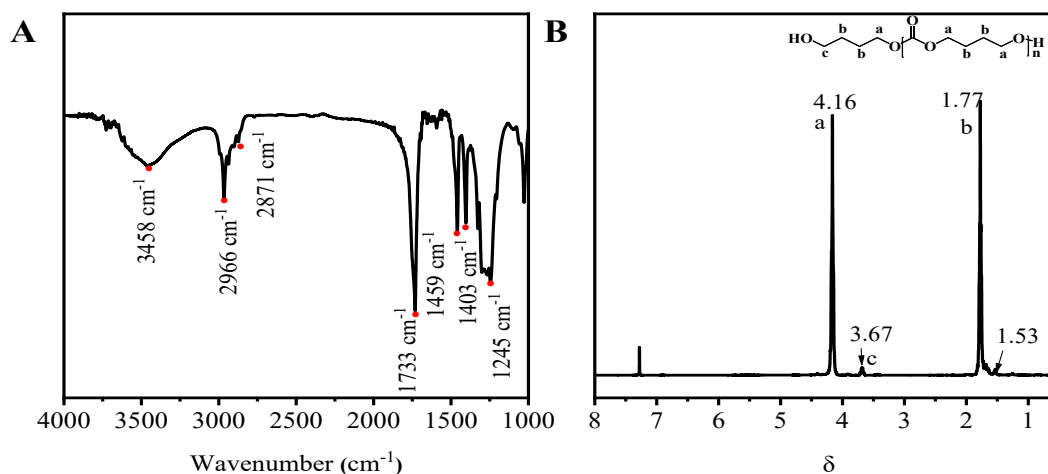


Fig. S3 FTIR (A) and <sup>1</sup>H NMR (B) spectra of PCDL

As shown in Fig. S3 A, the peak at 3458 cm<sup>-1</sup> can be attributed to the stretching vibration of -OH. The peaks observed at 2966 cm<sup>-1</sup> and 2871 cm<sup>-1</sup> correspond to the asymmetric and symmetric stretching vibration of -CH<sub>2</sub>, respectively. The peaks at 1459 cm<sup>-1</sup> and 1403 cm<sup>-1</sup> can be attributed to the bending vibration of -CH<sub>2</sub>. The peak at 1733 cm<sup>-1</sup> represents the bending vibration stretching of carbonate C=O. The peaks at 1245 cm<sup>-1</sup> reflect the stretching vibration of aliphatic carbonate O-C-O.

As shown in Fig. S3 B, the two multiplet signals at δ 4.16 and 1.77 with equal integration values are attributed to protons of methylene in polymer skeleton. The weak signals occurring at δ 3.67 and 1.53 are due to the terminal butanol group. Moreover, no signals at δ 7.4-7.5 are detected, implying the absence of terminal phenyl proton peak. In general, it can be confirmed that the generated polymers are PCDL.