

Tailoring microporosity of multi-hydroxyls hyper-crosslinked organic polymers for reinforced ambient chemical fixation of CO₂

Zengjing Guo^{1,*}, Shuguang Ning² Shicheng Xu¹, Yongying Zhang¹, Yifan Dong¹, Hongjing Han^{3,*}

¹*School of Chemistry and Chemical Engineering, Liaocheng University, Liaocheng, 252000, Shandong, P. R. China*

²*Shandong Lusoftware Digital Technology Co., Ltd., Jinan, 250001, China.*

³*College of Chemistry & Chemical Engineering, Northeast Petroleum University, Daqing, 163318, China*

Corresponding Authors*

E-mail: Dr. Hongjing Han, hongjing_han@163.com. Dr. Zengjing Guo, guozengjing@lcu.edu.cn.

Characterizations

X-ray diffraction (XRD) patterns were recorded on a Smart Lab X-ray diffractometer from Rigaku. Thermogravimetry (TG) analysis was carried out with an STA409 instrument in dry air at a heating rate of 10 K min⁻¹. Scanning electron microscope (SEM) images were registered in a HITACHI S-4800 field emission scanning electron microscope. Transmission electron microscopy (TEM) analysis was carried out on a JEM-2100 (JEOL) electron microscope operating at 200 kV. The surface chemical composition was determined by X-ray photoelectron spectroscopy (XPS, AXIS UltraDLD). Brunauer-Emmett-Teller (BET) surface area was measured at the temperature of liquid nitrogen (77 K) by using a BELSORP-MINI analyzer and the samples were degassed at 120 ° C for 3 h in a vacuum of 10⁻³ Torr before analysis. The CHN elemental analysis was performed on an elemental analyzer Vario EL cube. CO₂ adsorption isotherms were measured on a Micromeritics ASAP 2020 volumetric adsorption analyzer.

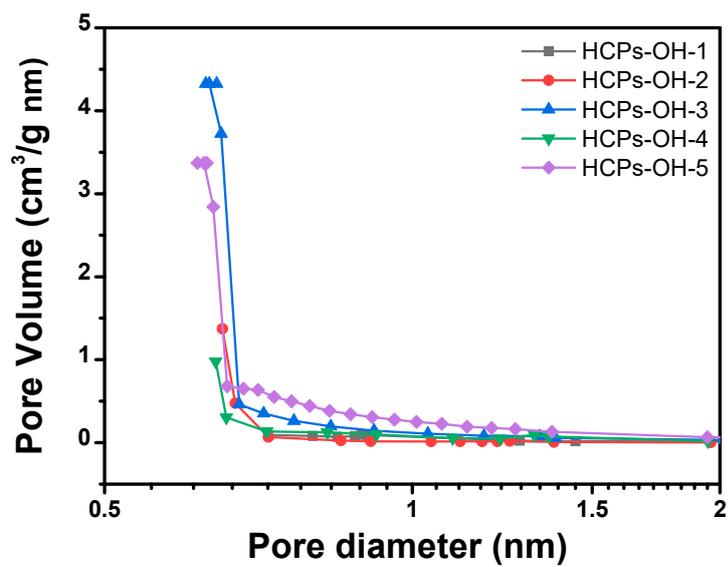


Figure S1 Micropore size distribution of various samples derived from HK method.

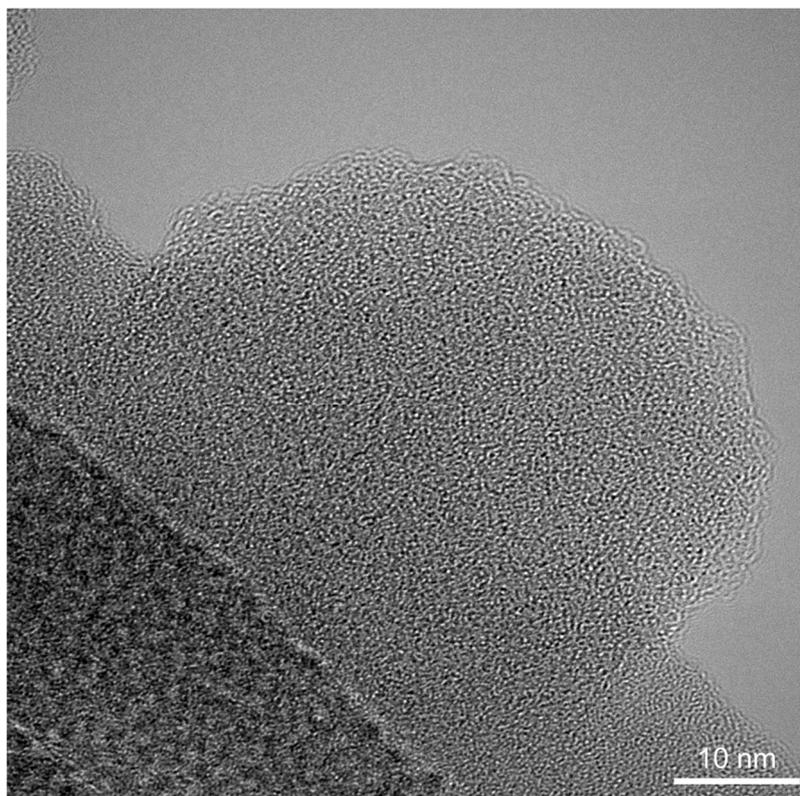


Figure S2. TEM images of HCPs-OH-3

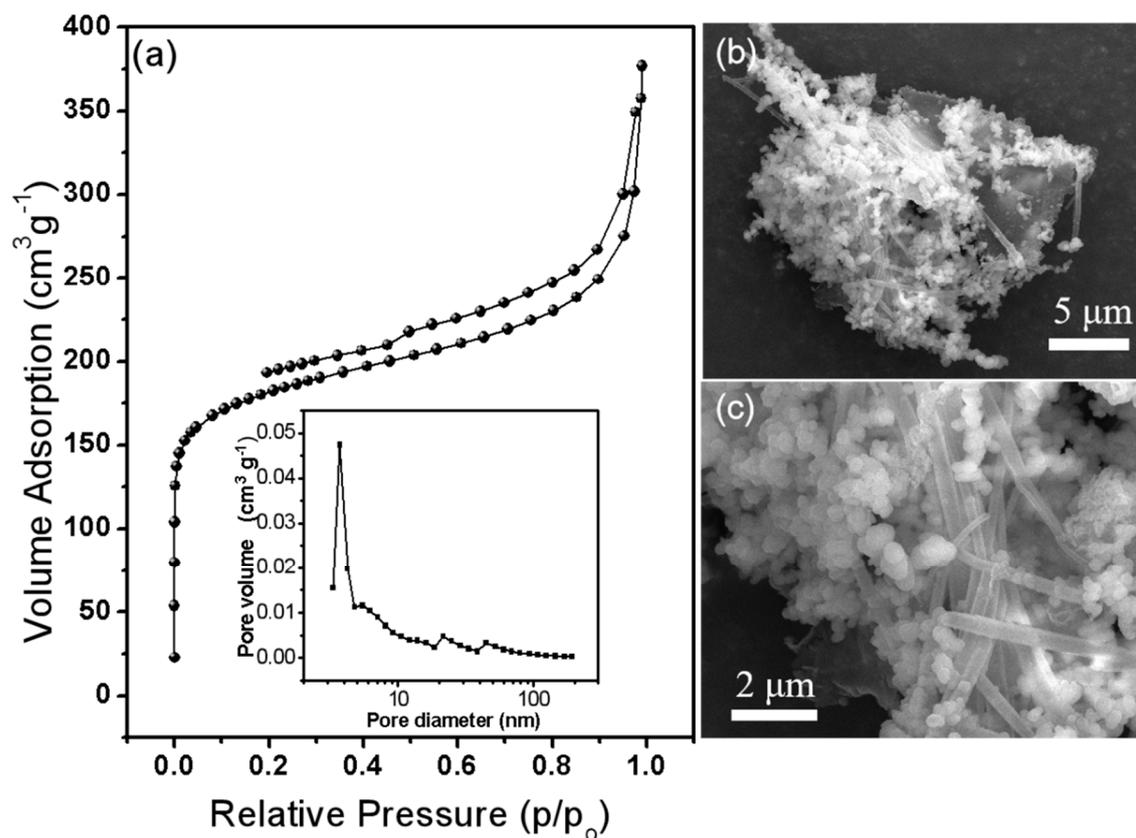


Figure S3. Characterizations of the reused catalyst HCPs-OH-3. (a) N₂ sorption isotherm and pore size distribution curve of the recovered catalyst HCPs-OH-3 from cycloaddition of CO₂ with epichlorohydrin. The SEM images (b, c) for the used catalyst keeps the similar morphology to that of the fresh sample.

Table S1 Cycloaddition of CO₂ with epichlorohydrin under ambient conditions.^a

Entry	Catalyst	Co-catalyst	Yield (%)	Sel. (%)
1	-	FeCl ₃	<1	99
2	HCPs-OH-3	FeCl ₃	82	99
3	HCPs-OH-3	-	81	99

^a epichlorohydrin 5 mmol, CO₂ 0.1 MPa (balloon), catalyst 0.03g, *n*-Bu₄NI 0.09g, RT, reaction time (10 h).