

Electronic Supplementary Material

Easily-manufactured paper-based materials with high porosity for adsorption/separation applications in complex wastewater

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Measurement of mechanical strength

The paper sheets were placed in a constant temperature environment of 23 °C and 50 % humidity for 24 h for subsequent experiments. According to the TAPPI standard T494 om-01, the paper tape with a width of 15 mm was used to measure the dry tensile strength of the paper on the Tensile strength tester (ZL-100). Similarly, the wet tensile strengths of the paper were measured according to the TAPPI standard of T456 om-03.

Detection of carboxyl content

The 50 mg samples were placed in 50 mL NaCl (0.001 mol/L) to fully disperse ultrasonically, and then the pH of the suspension was adjusted to two by adding 0.1 mol/L HCl to make the carboxylate groups in a protonated state. The suspension was then titrated against 0.5 mL increment of 0.05 mol/L NaOH. The titrations were duplicated three times to minimize errors.

Characterization

The FT-IR spectra were collected at 4000-600 cm⁻¹ wavelength range using a Fourier transform infrared spectrometer (FTIR-650, Tianjin Gangdong Co., Ltd.). Field emission scanning electron microscopy (FE-SEM, S-4800, Hitachi Ltd, Tokyo,

Japan) with a potential of 15 kV was used to examine the morphologies of paper sheets. Measurements were performed by accumulating 32 scans with a spectral resolution of 2 cm^{-1} . XPS experiments were performed in an X-ray photoelectron spectrometer (AXIS UltraDLD, Shimadzu). The pass energy was 160 eV, the scanning step length was 1.0 eV, and the survey spectra of $1200 \sim 0\text{ eV}$ was collected. Underwater oil contact angle, 2D topography and the roughness of papers were measured using a Contact Angle Meter (T200-Auto3 Plus, Biolin Scientific, Sweden). The optical microscopy images of the emulsified oil and filtrate were obtained using an optical microscope (SK200Digital, Motic Co., Ltd, China). The oil content was determined using TOC analyzer (TOC-V CPN, Shimadzu, Japan).

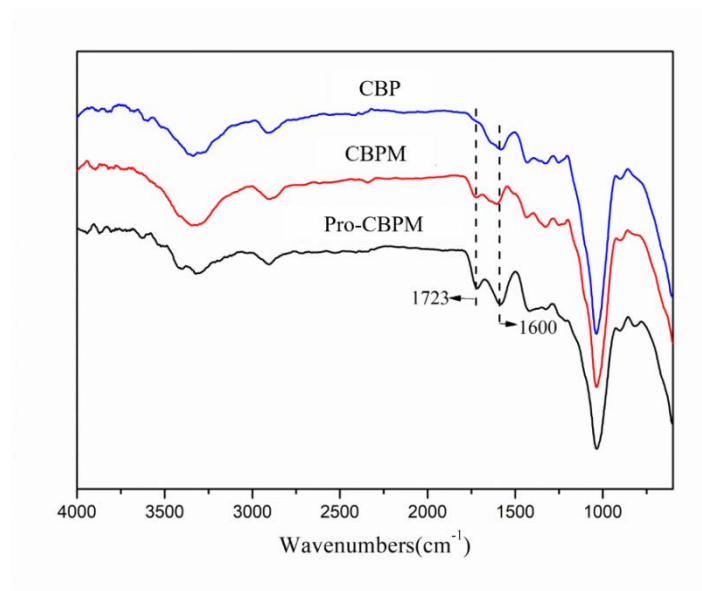


Fig. S1. FTIR spectra of different paper-based adsorbents;

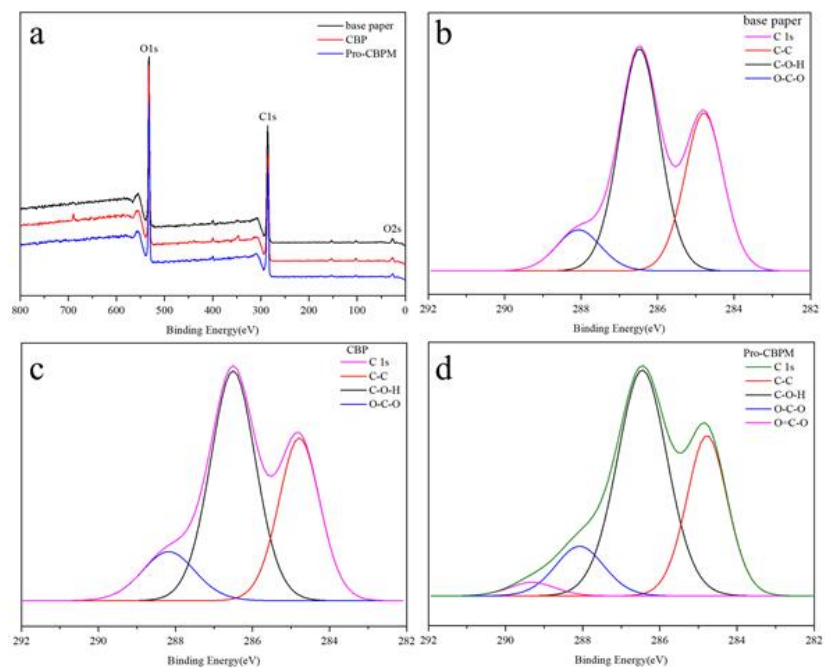


Fig. S2. XPS spectra of different paper-based adsorbents.

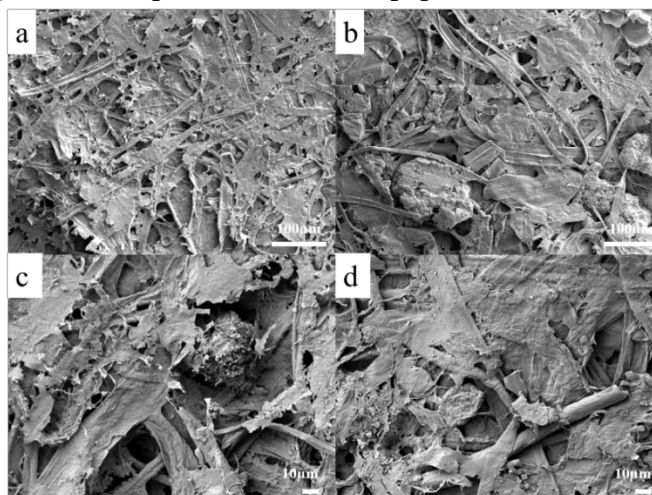


Fig. S3. SEM images of (a) CBP; (b) CBPM; Magnified SEM images of (c) CBP; (d) CBPM.

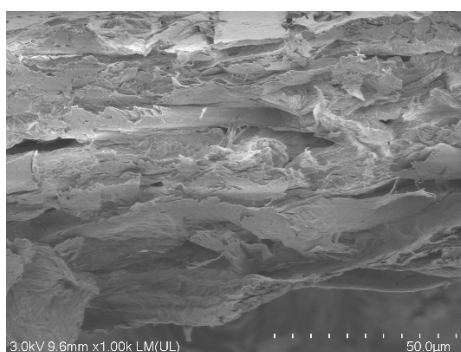


Figure S4 The cross-section SEM images of Pro-CBPM