

Supplementary Materials: Study of Amine Functionalized Mesoporous Carbon as CO₂ Storage Materials

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1. FTIR

The FTIR spectra of mesoporous carbon before carbonization process (MC-PC) compared to as-synthesized mesoporous carbon (MC) are shown in Figure 1a. The broad band in the range of 3250-3500 cm⁻¹ is assigned to O-H stretching vibration of phloroglucinol [33]. The weak band at ~2923 cm⁻¹ corresponds to symmetric and asymmetric C-H stretching vibrations that come from a bonding between formaldehyde and phloroglucinol [33]. After carbonization process, these bands disappeared, showing the complete removal of most of oxygen and hydrogen atoms of the precursors, Figure 1b.

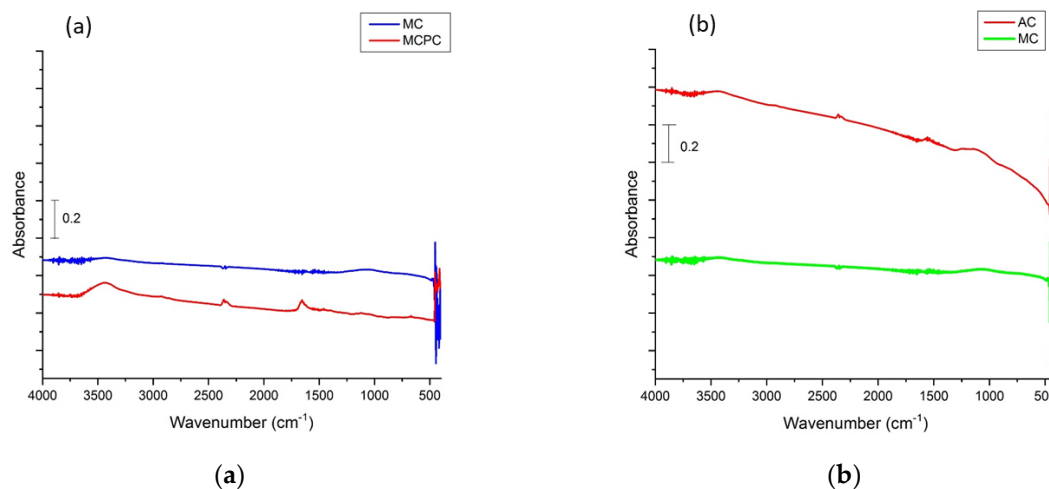


Figure S1. FT-IR spectra of MC (a) before (red) and after carbonization (blue); (b) MC (brown) and AC (green).

2.% Loading of Amine Compounds in Mesoporous Carbon and Activated Carbon

The %loading of amine compound was determined from EDX measurement, based on the wt% of N, and calculated using equation 1.

Example:

MCEDA49

Table S1. EDX for MCEDA49.

| Materials | wt% | | |
|-----------|-------|-------|-------|
| | C | N | O |
| MC-EDA49 | 56.11 | 23.23 | 20.66 |

Calculation:

$$\% \text{loading} = \frac{\text{Mr EDA}}{2 \times \text{Ar N}} \times \text{Wt\% N} = \frac{60 \text{ g/mol}}{2 \times 14 \text{ g/mol}} \times 23.23\% = 49\% \quad (1)$$

Using similar calculation, we summarized the list of MC and AC derivatives in Table S2 below:

Table S2. Name of adsorbent materials

| Materials | Amine loading | | Name of adsorbent |
|-----------|---------------|------|-------------------|
| | Target | Real | |
| MC/EDA | 50 | 49 | MCEDA49 |
| MC/TETA | 50 | 52 | MCTETA52 |
| AC/TETA | 30 | 14 | ACTETA14 |
| AC/TETA | 50 | 21 | ACTETA21 |