Supporting Information

Manuscript title: CO_2 sorption enhancement of extruded-spheronized CaO-based pellets by sacrificial biomass templating technique

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Number of papers: 4

Number of Figures: 2

Preparation of biomass-templated pellets.

The biomass-templated pellets were prepared via an extrusion-spheronization method, as shown in Fig. S1. The detailed preparation process is as follows: first, weighted amounts of calcium hydroxide reagent and biomass template materials were vigorously blended to obtain the homogeneous mixtures; simultaneously moderate amount of deionized water was sprayed to wet the mixtures. Then, the wet mixtures were extruded to obtain columned extrudates using a mini extruder (E25, Xinyite Technology Co., Ltd., China) with a 1 mm die. During the extrusion process, the rotational speed of the mini extruder was maintained at 90 rpm. Finally, the columned extrudates were spheronized in a spheronizer (Mini S, Xinyite Technology Co., Ltd., China) at a rotational speed of 1000 rpm for 5 min. The biomass-templated pellets with particle size fraction of 0.9-1.25 mm were collected and air dried for overnight prior to being used for the CO_2 uptake test.

Figure captions:

Fig. S1. The preparation process of biomass-templated pellets.

Fig. S2. Schematic for the identification of three carbonation stages of sorbent pellets.

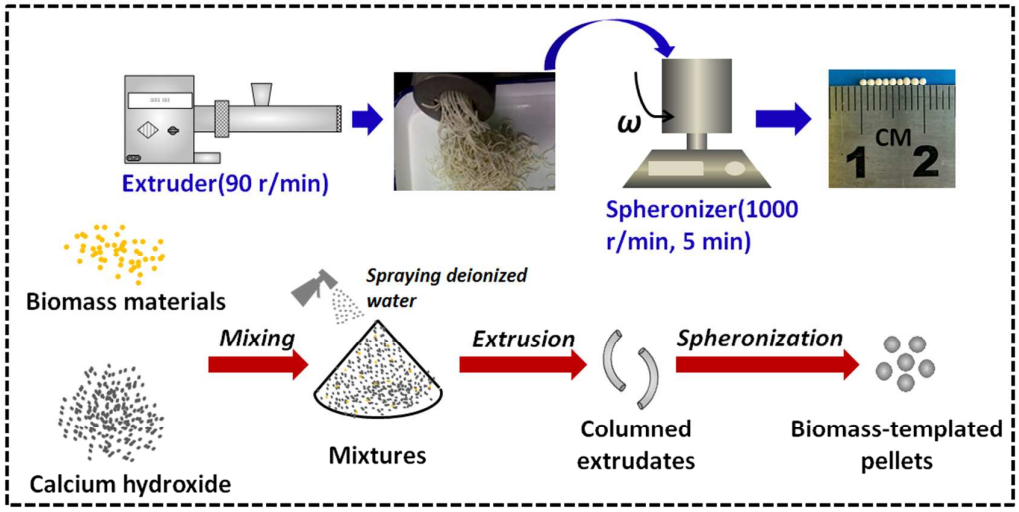
Extruder(90 r/min)
ω
Spheronizer(1000 r/min, 5 min)
CM
1 2
Biomass materials
Spraying deionized water
Mixing
Extrusion
Spheronization
Calcium hydroxide
Mixtures
Columned extrudates
Biomass-templated pellets

Fig. S1.

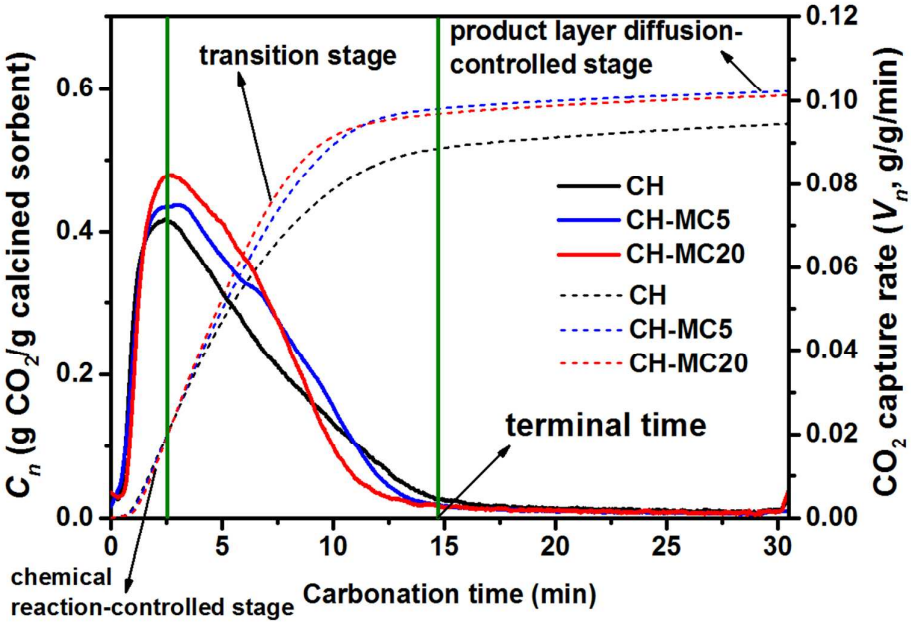
transition stage
product layer diffusion-controlled stage
CH
CH-MC5
CH-MC20
CH
CH-MC5
CH-MC20
terminal time
chemical reaction-controlled stage
Carbonation time (min)
C_n (g CO_2/g calcined sorbent)
CO_2 capture rate (V_n, g/g/min)
0.0
0.2
0.4
0.6
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0
5
10
15
20
25
30

Fig. S2.