Electronic Supplementary Material (ESI) for RSC Advances.

Acquiring effective CaO-based CO_2 sorbent and achieving selective methanation of CO_2

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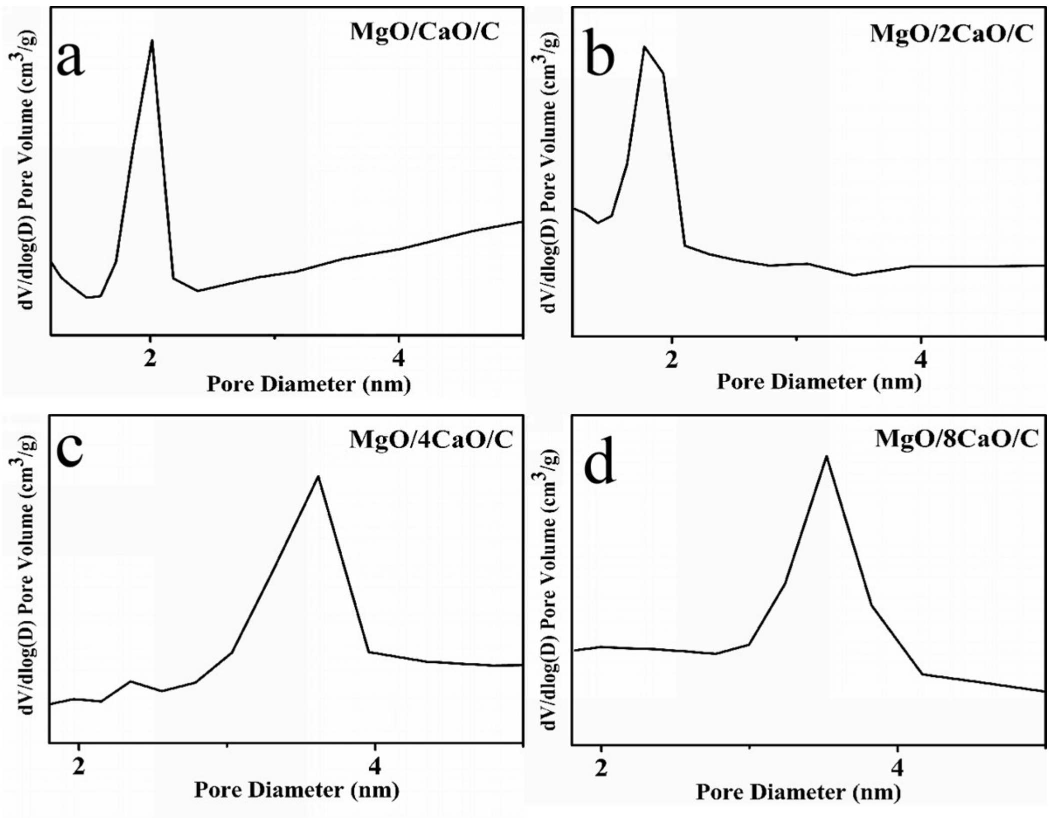

Fig. S1. Pore size distributions of (a) MgO/CaO/C; (b) MgO/2CaO/C; (c) MgO/4CaO/C; (d) MgO/8CaO/C sorbents.

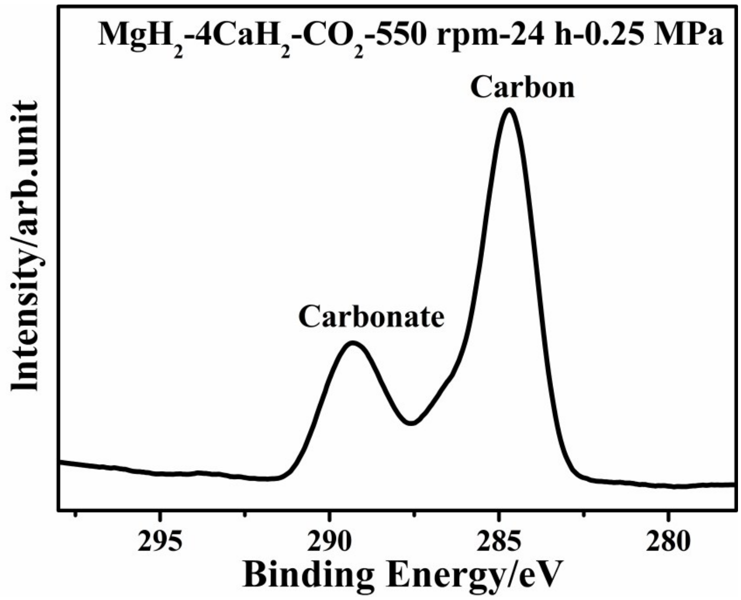

Fig. S2. Carbon XPS spectrum of the solid products formed in the reaction of MgH_2/CaH_2 mixture with CO_2.

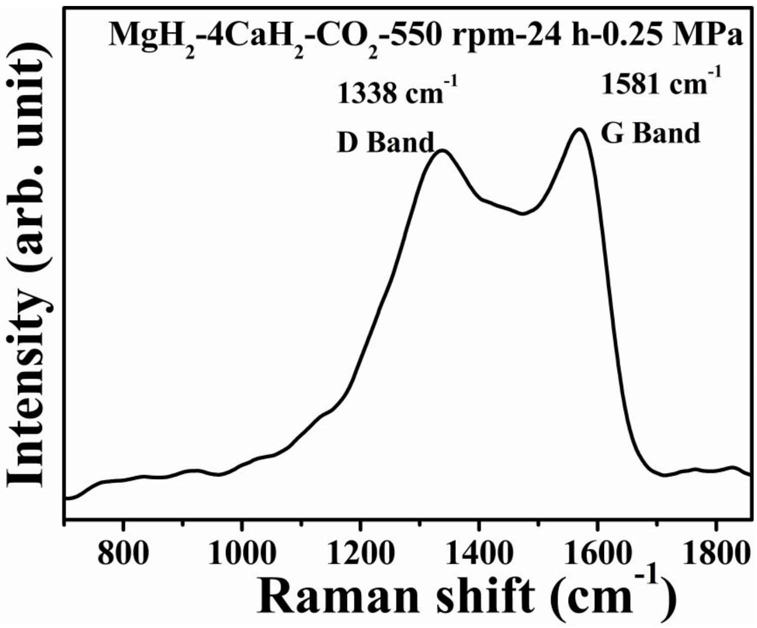

Fig. S3. Raman spectrum of amorphous carbon formed in the reaction of MgH_2/CaH_2 mixture with CO_2.

Calculation of the molar amount of amorphous carbon in the samples:

The following equations are used to calculate the mole amount of carbon in the MaO@xCaO@C (x = 1, 2, 4, and 8) samples formed in the reaction of MgH_2/CaH_2 mixture with CO_2:

$$\mathbf{S} = 1356.1184 \cdot \mathbf{P}_{\mathbf{CH_4}} + 42101.053 \quad \text{(S1)}$$

$$\mathbf{P}_{\mathbf{CH_4}}\mathbf{V} = \mathbf{n}_{\mathbf{CH_4}}\mathbf{RT} \quad \text{(S2)}$$

$$\mathbf{n}_{\mathbf{C}} = \mathbf{n}_{\mathbf{CO_2}} - \mathbf{n}_{\mathbf{CH_4}} \quad \text{(S3)}$$

In Eqs. (S1-S3), S is the peak area measured by GC. P_{CH_4} is the partial pressure of CH_4, V is the volume of the stainless steel milling vessel, n_{CH_4} is the mole amount of CH_4 produced, R is the ideal gas constant, T represents room temperature (298 K), n_C is the mole amount of C produced, n_{CO_2} is the mole amount of CO_2 used.