

**Effects of preparation method on cyclic stability and CO<sub>2</sub> absorption capacity of synthetic CaO-MgO absorbent for sorption enhanced hydrogen production**

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A novel and economical method for preparing CaO-based high-temperature CO<sub>2</sub> absorbents that are applied for sorption-enhanced hydrogen production is introduced. CaO-MgO absorbents prepared by the co-precipitation method show excellent cyclic stability but poor absorption capacity (~8-14 g CO<sub>2</sub>/100 g absorbent). An additional hydration process provided spacious CO<sub>2</sub> pathways resulting in a significant increase of the absorption capacity (~17.4-47.8 g CO<sub>2</sub>/100 g absorbent) with excellent cyclic stability. As the MgO content increased, the absorption ratio of the absorbent and the degree of CaO conversion also increased. In addition, XRD analysis revealed that the hydration process followed by calcination at 900 °C led to the formation of a partial solid-solution in the CaO-MgO absorbent containing 25 wt% MgO.