# Surfactant assisted CaO-based sorbent synthesis and their application to high-temperature $CO_2$ capture

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**ABSTRACT**

The concern of carbon dioxide ($CO_2$) emissions, a main contribution of greenhouse gases, has been emerged as an important issue for environmental impact. Adsorption of $CO_2$ by porous solid materials is proven to be one of efficient techniques for $CO_2$ capture technologies. In the present work, attempted has been made to improve property of porous solid materials, CaO-based sorbent, applied for high-temperature $CO_2$ capture. $CaCO_3$ and CaO-based alumina was synthesized using precipitation technique with the addition of sulfonic single chain (SDS) and gemini (12-carbon hydrophobic chains and 3-carbon alkyl spacer, 12-3-12) surfactants for controlling/modifying physical properties. Our studies showed that the addition of anionic surfactants affected phase formation and polymorph of $CaCO_3$, where stronger effect was observed with gemini surfactant. The synthetic $CaCO_3$ was derived to form CaO and applied for capturing $CO_2$ at 600 °C, 15% v/v $CO_2$ ($N_2$ balanced). The results showed that CaO synthesized with adding gemini surfactant offered higher $CO_2$ sorption capacity than single chain surfactant. By incorporating calcium with alumina using co-precipitation technique, the addition of gemini surfactant showed a good impact on $CO_2$ capture performance as an increase in $CO_2$ sorption capacity was observed. However, sintering effect was still not yet be resolved with the addition of gemini surfactant as $CO_2$ sorption capacity decreased upon multiple cycles of $CO_2$ capture.

**KEYWORDS:**

$CaCO_3$; CaO-based sorbent; $CO_2$ sorption; SDS; Gemini surfactant