Lithium silicate-based sorbents containing Li_2SiO_3 and $LiAlO_2$ for CO_2 capture at high temperature

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Lithium silicate based sorbent was developed for CO_2 capture at high temperature between 550°C and 700°C. This sorbent (LS2A10) was prepared by physical mixing of Li_2CO_3 with SiO_2 in the molar ratio of 2:1 with 10wt% Al_2O_3. The CO_2 capture capacity of LS2A10 sorbent maintained 200 mg CO_2/g sorbent during multiple cycles. On the other hand traditional Li_4SiO_4 sorbent (LS2) which was prepared by physical mixing of Li_2CO_3 with SiO_2 in the molar ratio of 2:1 decreased CO_2 capture capacity from 227.1 to 51.2 mg CO_2/g sorbent during multiple cycles. From XRD analysis, we confirm formation $LiAlO_2$ and Li_2SiO_3 unlike LS2 sorbent. And from SEM analysis, we confirm that they prevent its aggregation. So we conclude that Al_2O_3 performed a key role in long term stability of this sorbent by making $LiAlO_2$ and Li_2SiO_3. From these results, we confirm that LS2A10 sorbent improved long term stability compared with LS2 sorbent.