

고온에서 CO₂ 흡수/재생을 위해 새로운 메커니즘을
가진 소듐-리튬실리케이트 기반
CO₂ 건식 흡수제 개발

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New sodium lithium silicate-based dry sorbent (LONS) was developed for CO₂ capture at high temperature range between 550°C and 700°C (10 vol.% CO₂, 10 vol.% H₂O, Balance N₂). The LONS sorbent developed in this study was prepared by wet-mixing LiOH (Li₂CO₃) with sodium silicate solution (Na₂SiO₃) instead of SiO₂. The CO₂ capture capacity of lithium orthosilicate-based sorbent (LS) was gradually decreased from 20 wt% to 5 wt% during multiple cycles. On the other hand, the LONS sorbent maintained about 23~25 wt% during multiple cycles. We found that the new active material of the LONS sorbent is NaLi₃SiO₄, which reacts with CO₂ and transforms into Li₂SiO₃, Li₂CO₃ and Na₂CO₃ at the regeneration temperatures below 650°C as follows: $2\text{NaLi}_3\text{SiO}_4 + 2\text{CO}_2 \leftrightarrow 2\text{Li}_2\text{SiO}_3 + \text{Li}_2\text{CO}_3 + \text{Na}_2\text{CO}_3$. In particular, the LONS sorbent showed faster sorption rate than LS sorbent. Consequently, we concludes that new sodium lithium silicate-based dry sorbent developed in this study can be used as a sorbent having the potential for CO₂ capture at high temperature ranges.