

# 중/고온용 Alloy계 신개념 CO<sub>2</sub> 흡수제 개발

Development of new alloy-based dry sorbents for CO<sub>2</sub> capture at middle/high temperatures



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### 최종연구목표

- 연소 후 배가스 내 CO<sub>2</sub> 포집을 위한 다단 CO<sub>2</sub> 포집용 중/고온 Alloy계 신개념 흡수제 개발

### 주요연구내용

- 1단계: 원천 기술 개발
  - 다단 CO<sub>2</sub> 포집 공정에 적용 가능한 온도 맞춤형 최적 흡수제 설계 및 선정
  - 흡수물질 특성파악
- 2단계: 기술 확립
  - 나노 구조제어를 통한 고효능 및 불순물에 내성이 있는 신개념 흡수제 개발
  - 나노구조제어 및 최적 합성 조건 확립
- 3단계: 실증화
  - 맞춤형 신개념 흡수제의 Pilot Plant급 공정 적용 및 특성 개선과 Pilot Plant 급 운전 연계 기반 구축

### 기대효과

- 열교환형 흡수공정의 개념을 도입한 다단 CO<sub>2</sub> 포집 공정은 기존 기술 대비 CO<sub>2</sub> 회수 비용을 감소시킬 수 있을 뿐만 아니라 철강, 시멘트 등 산업설비에서 배기가스 중의 CO<sub>2</sub> 분리에 적용 가능

### Research Goals

- Development of new alloy-based dry sorbents for multi-stage CO<sub>2</sub> capture from flue gas in the energy exchangeable fluidized-bed reactor at middle and high temperature range

### Research Contents

- Step 1: Development of original technology
  - Design and screening of the new alloy-based dry sorbent for multi-stage CO<sub>2</sub> capture process
  - Characterization of the sorbents
- Step 2: Technical establishment
  - Development and synthesis of the new alloy-based dry sorbent having the high CO<sub>2</sub> capture capacity and the impurity resistance for multi-stage CO<sub>2</sub> capture process through nano technology
  - Establishment of optimal synthesis conditions and nano-structure control technology
- Step 3: Technical demonstration
  - Performance improvement of the innovative dry sorbent and the application of the new dry sorbent to multi-stage CO<sub>2</sub> capture pilot plant

### Expected Effects

- Application of new alloy-based dry sorbent to the energy exchangeable CO<sub>2</sub> capture system is economical and can be applicable to many small sale plants like cement, steel and chemical industry

### 기술개발 TRM

Contents	Stage 1			Stage 2			Stage 3			2020~
	2011~2012	2012~2013	2013~2014	2014~2015	2015~2016	2016~2017	2017~2018	2018~2019	2019~2020	
Development of new alloy-based dry sorbents (KNU)	Development of original technology - Design and synthesis of new sorbents			Technical establishment			Technical demonstration			Large scale verification & commercialization
				Improvement of new sorbents related to bench-scale multi-stage CO <sub>2</sub> capture process			Improvement and mass production of sorbents related to pilot multi-stage CO <sub>2</sub> capture process			
Design and synthesis of new compounds with functional surface (KJU)	Development of new guest technologies			Establishment of manufacturing condition of sorbent based on new guest tech.			Production of sorbent based on new guest technology			
				Selection of new guest tech. and development of manufacturing process of sorbent			Verification of new guest technology			
Development of multi-step CO <sub>2</sub> capture process (KRICT)	Composition of multi-stage CO <sub>2</sub> capture process & verification of the technology			Design of multi-stage CO <sub>2</sub> capture process			Verification of pilot (0.1 MW) multi-stage CO <sub>2</sub> capture process			
	Interpretation of sorbents flow			Realization of bench-scale multi-stage CO <sub>2</sub> capture process						