

# 상온, 상압용 이산화탄소 포집을 위한 탄소기반 흡착소재 개발



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Development of carbon based novel adsorbents for carbon dioxide capture at room temperature and atmosphere

### 최종연구목표

- 고효율 이산화탄소 포집용 탄소소재를 개발하여 상온(298 K)/대기압(1 bar)의 조건에서 40 wt.% 이상의 이산화탄소를 포집
- 이 기술을 바탕으로 탄소소재의 이산화탄소 저장메커니즘을 정립하여 이산화탄소 포집용량 향상이 가능한 원천소재 개발

### 주요연구내용

- 고비표면적 및 초고다공성 나노소재의 제조기술 개발
- 기능성 나노소재 표면처리기술 개발
- 고효율 이산화탄소 흡착(@ 상온, 1 bar)

### 기대효과

- 나노구조 탄소재료의 합성, 탄소표면 분석기술, 기공경 제어기술 및 기체 흡착기술에 대한 원천기술의 확보
- 국제 환경규제 문제해결로 국내 자동차산업이 탄력을 받을 것이며, 더불어 국내에서 소요되는 매년 5조원 규모의 기상공해 방지시장의 국산화 및 역수출의 발판을 마련할 수 있을 것으로 기대

### Research Goals

- The purpose of this work is to develop the innovative nano-materials for high efficient CO<sub>2</sub> capture for low-carbon economy. In order to the increase the amount of CO<sub>2</sub> adsorption, we will design the well developed hybrid nano-materials
- We will have also investigated the CO<sub>2</sub> adsorption mechanism for high efficient CO<sub>2</sub> adsorption through the control of CO<sub>2</sub>-friendly sites

### Research Contents

- Development of high specific surface area of carbon molecular sieves
- Development of functional surface treatment technology of carbon materials
- Evaluation of CO<sub>2</sub> capture(@ 298 K/1 bar)

### Expected Effects

- Development of core technology for the synthesis of nanostructured carbons, analysis technologies of carbon surfaces, controlling of pore diameters, and gas adsorption
- Domestic automobile industries can highly grow up due to the salvation of environmental restriction. Moreover, it is expected to prepare the re-exportation and the domestics of an annually five trillion-scales prevention markets of environmental pollution by greenhouse gases

### 기술개발 TRM

Contents	Stage 1			Stage 2			Stage 3		
	2011~2012	2012~2013	2013~2014	2014~2015	2015~2016	2016~2017	2017~2018	2018~2019	2019~2020
Development of carbon-based hybrid nanomaterials (at 298K and 1 bar)	Development of carbon-based hybrid nanomaterials (CO <sub>2</sub> adsorption capacity 40 wt.%, @ 298 K and 1 bar)								
New adsorbent for CO <sub>2</sub> capture performance evaluation			Construction of evaluation system for CO <sub>2</sub> capture dry-adsorbent, establishing mechanism of dry-adsorbent on CO <sub>2</sub> capture/regeneration, complement in continuous CO <sub>2</sub> capture process system						
Original manufacturing tech. for-adsorbent (mass production)		Optimization of dry-adsorbent and making capture process in lab scale		Development of mass production tech. for dry-adsorbent with layered structure by top-down approach(10 kg/day)			Complement in the mass production tech. and performance improvement of CO <sub>2</sub> capture process system(Improved durability and regeneration)		
Optimization of dry sorbent CO <sub>2</sub> capture process conditions				Expected to break through CO <sub>2</sub> capturing process system					