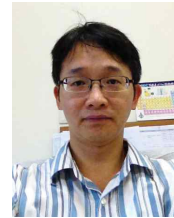


혁신적인 CO₂ 포집용 금속-유기 골격체 개발

Development of innovative metal-organic frameworks for CO₂ capture



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최종연구목표

- 거대 비표면적과 CO₂ 흡착용량 성능을 발현하는 고밀도 open metal sites를 갖는 MOFs 개발과 성능향상을 통한 최적의 건식흡착제 완성

주요연구내용

- 화학적 설계에 기반한 획기적 CO₂ 흡착용량을 갖는 MOFs 개발
- 물과 화학적 안정성이 확보된 고성능 MOFs 개발
- 크기와 형상이 조절을 통한 MOFs의 재료엔지니어링
- 효율적 합성방법 개발을 통한 재료 경제학 실현
- 최적화된 MOF재료를 이용한 실험실 규모의 흡착시스템 개발

기대효과

- CO₂ 포집 지표에 대한 건식 흡착제의 고성능화
- 고수준 물에 견딜 수 있고 화학적, 열적으로 견고한 재료 제조를 통해 MEA 대체 물질 개발
- MOFs의 화학적 설계를 통한 재생에너지 감축과 그에 따른 CO₂ 포집 비용 경감

Research Goals

- Development of MOFs with high-density open metal sites exhibiting giant surface area and CO₂ uptake capability and achievement of optimal solid adsorbents through property improvement

Research Contents

- Chemical design and development of MOFs with high CO₂ capture
- High-performance MOFs with water and chemical stabilities
- Materials engineering of MOFs by controlling size and shape
- Materials economics through development of efficient synthetic methods
- Adsorption system development on lab scale using optimal MOF materials

Expected Effects

- High performance of MOFs in CO₂ capture
- Development of MEA substitute materials with water, chemical, and thermal stabilities
- Reduction of regeneration energy via chemical design of MOFs and reduction of CO₂ capture expenses

기술개발 TRM

Development Topics	Stage 1		Stage 2			Stage 3			
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Chemical design and development of MOFs with high CO ₂ capture	Development of MOFs with high-density open metal sites	Amine functionalization of MOFs	Improvement of materials stability	Feedback and high-performance MOF development	Improvement of materials stability	Feedback and property improvement	Mass production of MOF materials	Optimization of solid adsorbents using MOFs	Establishment of industrially applicable MOF materials
Materials engineering of MOFs		Site and shape controls of MOFs	Investigation of CO ₂ diffusion kinetics		Determination of optimal parameters on materials		Application to reduction of regeneration energy		
Materials economics			Improvement of MOFs' yield	Development of economical synthetic procedures for material components		Development of efficient syntheses based on industrial demand			Realization of materials economics
Adsorption system development on lab scale							Test on adsorption system with optimal materials	Improvement of the system upon feedback	Fabrication of practical systems for CO ₂ capture