

NT(나노 물질)-BT(미생물, 바이오 필름)를 이용한 CO₂ 저장능력 향상 융합기술 개발



노 열 (roh@jnu.ac.kr)
전남대학교
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Roh, Yul
Chonnam National Univ.

Enhancement of Geological Carbon Sequestration Using Hybrid Nano(Nanomaterial)- and Bio(Microbe, Bio-Film)-Technology

최종연구목표

- CO₂ 지중 저장 대상 지층 시스템(저장암+덮개암+지하수+미생물+나노물질)의 성능(저장성능, 밀봉성능)평가에 기초하여 NT(나노 물질)-BT(미생물, 바이오 필름) 기술을 이용하여 저장암의 저장성능 향상, 덮개암의 밀봉성능 향상기술을 개발

주요연구내용

- 지중저장 대상 암석 공극 내 CO₂ 저장량을 향상시킬 수 있는 BT 기술 개발
- 지중저장 대상 덮개암의 CO₂ 밀봉능력을 향상시킬 수 있는 BT 기술 개발
- 지중저장 대상 덮개암의 CO₂ 밀봉능력을 향상시킬 수 있는 NT 기술 개발
- 마이크로모델링을 이용한 밀봉 및 성능향상 예측

기대효과

- 이산화탄소 지중저장 대상 지층 시스템에서 저장암의 저장 성능향상
- 이산화탄소 지중저장 대상 지층 시스템에서 덮개암의 밀봉 성능향상
- 이산화탄소 지중저장 능력 향상을 위한 혁신적 바이오기술 개발
- 이산화탄소의 지중저장 능력 관련 신규인력의 양성

Research Goals

- To develop an innovative technology, Bio-Nano-Technology, to enhance geologic carbon sequestration using microbes and bio-films for mitigation of well leakage and enhancement of mineral trapping and solubility trapping of CO₂

Research Contents

- Mineral trapping using microbes and bio-films via enzymatic and bio-film approaches for enhancement of geologic carbon sequestration
- Mitigation of well leakage using biofilms
- Mitigation of well leakage using engineered nanomaterials
- Modeling and prediction

Expected Effects

- Enhance geologic carbon sequestration by mitigation of well leakage and well cement degradation of cap rock
- Enhance geologic carbon sequestration by mineral trapping and solubility trapping in deep subsurface environments
- Develop an innovative technology, Bio-Technology, to enhance geologic carbon sequestration
- Educate graduate students in the area of geologic carbon sequestration

기술개발 TRM

Development Topics	Stage 1		Stage 2			Stage 3			
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Mitigation of well leakage using biofilms and EPS	Search microbes for formation of biofilms and EPS	Development of caprock sealing using biofilms and EPS	Development of caprock sealing using biofilms and EPS			In-situ application of caprock sealing using biofilms and EPS			In-situ application of caprock sealing using biofilms and EPS
Mineral trapping using microbes and bio-films via enzymatic and bio-film approaches for enhancement of geologic carbon sequestration	Search microbes for CO ₂ mineral trapping	Development of CO ₂ mineral trapping by microbes	Development of CO ₂ mineral trapping by microbes				In-situ application of CO ₂ mineral trapping by microbes		In-situ application of CO ₂ mineral trapping by microbes
Mitigation of well leakage and CO ₂ mineral trapping using engineered nanomaterials(NMs)			Development of engineered NMs	Mitigation of well leakage using engineered NMs	CO ₂ mineral trapping using engineered NMs			In-situ application of well leakage using engineered NMs	In-situ application of well leakage using engineered NMs
Modeling and prediction				Micro-modelling	Prediction	Micro-modelling/ Prediction	Micro-modelling/ Prediction	Micro-modelling/ Prediction	Micro-modelling/ Prediction