Microfluidic Approaches mimicking BIoGeological conditions to investigate subsurface CO2 recycling

Fact Sheet

Project Information

Big Mac

Grant agreement ID: 725100

Project website

DOI
10.3030/725100

Project closed

EC signature date
11 May 2017

Start date
1 November 2017

End date
31 July 2023

Funded under
EXCELLENT SCIENCE - European Research Council (ERC)

Total cost
€ 1 995 354,00

EU contribution
€ 1 995 354,00

Coordinated by
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS
France

Objective

The management of anthropogenic CO2 will be one of the main challenges of this century given the dramatic impact of greenhouse gases on our living environment. A fascinating strategy to restore the advantages of stored CO2 as a raw material would be to consider a slow biological upgrading process of CO2 in deep geological formations.
Significantly, the recent development of microfluidic tools to study pore-scale

phenomena under high pressure, opens new avenues to investigate such strategies. Thus, the strategic objective of this project is to develop and to use “Biological Geological Laboratories on a Chip - BioGLoCs” mimicking reservoir conditions in order to gain greater understanding in the mechanisms associated with the biogeological conversion process of CO2 to methane in CGS environment at pore scale.
The specific objectives are: (1) to determine the experimental conditions for the development of competent micro-organisms (methanogens) and to establish the methane production rates depending on the operating parameters, (2) to evaluate the feasibility of a H2 in situ production strategy (required to sustain the methanogenesis process), (3) to investigate the full bioconversion process in 2D and 3D, (4) to demonstrate the process scaling from pore scale to liter scale and (5) to evaluate the overall process performance.
This multidisciplinary project gathering expertise in chemical engineering and geomicrobiology will be the first ever use of microfluidics approaches to investigate a biogeological transformation taking into account the thermo-hydro-bio-chemical processes. It will result in the identification of efficient geomicrobiological methods and materials to accelerate the CO2 to methane biogeoconversion process. New generic lab scale tools will be also made available for investigating geological-related topics (enhanced oil recovery, deep geothermal energy, bioremediation of groundwater, shale gas recovery).

Fields of science (EuroSciVoc)

engineering and technology > environmental biotechnology > **bioremediation**

engineering and technology > environmental engineering > energy and fuels > fossil energy > **natural gas**

engineering and technology > **chemical engineering**

natural sciences > chemical sciences > organic chemistry > **aliphatic compounds**

engineering and technology > environmental engineering > energy and fuels > renewable energy > **geothermal energy**

Keywords

High pressure microfluidics

Microreaction engineering

Programme(s)

H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) MAIN PROGRAMME

Topic(s)

ERC-2016-COG - ERC Consolidator Grant

Call for proposal

ERC-2016-COG

See other projects for this call

Funding Scheme

ERC-COG - Consolidator Grant

Host institution

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

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Address

RUE MICHEL ANGE 3
75794 Paris
France

Region

Ile-de-France > Ile-de-France > Hauts-de-Seine

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Beneficiaries (1)

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

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