

Downhole Sensor Network for Monitoring CO₂ Migration

Award Number: SC0011876

Project Summary:

The goal of this project was to develop a network of downhole sensors that can be permanently installed to continuously monitor the local carbon dioxide (CO₂) condition directly within and around the reservoir. The sensor technology was based upon Tunable Diode Laser Absorption Spectroscopy gas measurement. The purpose of the network of monitoring, verification, and accounting (MVA) sensors was to provide (1) improved understanding of CO₂ storage and transport processes, (2) a system for continuous monitoring of migration of stored CO₂, and (3) assurance of storage reservoir efficiency and stability, including protection of neighboring property and aquifers.

Prime Performer:

Physical Sciences, Inc.

Principal Investigator:

Richard Wainner

Project Duration:

6/9/2014 – 1/27/2019

Performer Location:

Andover, Maryland

Program:

Carbon Storage

Project Outcomes:

This project was awarded funding for Phase I and Phase II research. Researchers successfully constructed and tested an Alpha prototype of the sensor after multiple iterations. The Beta prototype of the sensor was not constructed and field tested as planned, due to the resources required to overcome the challenges encountered with the Alpha prototype. The decision to abort the sensor testing was made after laboratory testing showed that the sensor in development was unable to accurately measure CO₂ dissolved in water (H₂O) due to unexpected drifts, which appeared to be thermally induced. However, the end results from the lab test confirm that the designed approach to downhole CO₂ sensing is feasible in an on/off mode (CO₂ present or not present).