ANL/ES-C0700300

FINAL CRADA REPORT

Date: 2009 November 30

CRADA Number: C0700300

CRADA Title: Novel CO_2 Capture

CRADA Start/End Date: October 2007 – September 2008

Argonne Dollars: $150,000
Participant Dollars: $37,500

Argonne PI: Seth W. Snyder

Industrial Partner:

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NON PROPRIETARY

Summary of Major Accomplishments:

The goal of this work was to use electrochemically driven pH control to develop a second generation, enzyme-based contained liquid membrane (CLM) permeator to extract CO_2 from a variety of coal-based flue gas streams more efficiently than does the CLM current design, while achieving performance coincident with DOE targets of less than 45% Cost of electricity (COE) in 2007 and less than 20% COE in 2012. Central to this goal the CLM would be alkaline (>pH 8) at the feed gas side and acid (<pH 6) at the permeate side.

Argonne demonstrated the technical feasibility for CO_2 capture and release using Argonne's resin-wafer electrodeionization (RW-EDI) system integrated with Carbozyme's carbonic anhydrase (CA) enzyme. Argonne developed RW-EDI for pH controlled desalination of process streams (e.g. Patents 7,452,920 & 7,306,934). In the current work, Argonne captured CO_2 as HCO_3^- and released it as CO_2. The goal is to both capture CO_2 from a simulated flue gas stream and release it within the DOE targets for increase in COE.

Initial performance results indicate that the 2012 COE targets are achievable with the developed technology. The design is subject to patent-hold. This task was funded in an exploratory phase, so no process optimization was attempted. Argonne believes that with optimization this performance could be significantly improved.

Summary of Technology Transfer Benefits to Industry:

IP was jointly developed under this CRADA. A large corporation (Nalco Company) was identified for validation, scale-up, and commercialization. This work will be partially funded through an ARPA-E grant (Energy Efficient Capture of CO2 from Coal Flue Gas). The CRADA partner will participate in any license revenue from commercialization.

Other Information/Results: (Papers, Inventions, Software, etc.)

One invention was developed as part of this CRADA: ANL-INV-08-071.

TITLE:
CARBON DIOXIDE CAPTURE USING RESIN-WAFER ELECTRODEIONIZATION

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The invention was reduced to practice and a provisional patent was filed on May 29, 2009 by Olson & Cepuritis (Serial No. 61/217,387).

This is a CRADA-subject invention that includes inventors from both the Participant and the Contractor.

Argonne did not publish or publically present work from the CRADA. Carbozyme may have published or presented some aspects of the work.