

TITLE: FLY ASH CATALYZED MERCURY OXIDATION
CHLORINATION REACTIONS

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GRANT NUMBER: DE-FG26-06NT42730

PERFORMANCE

PERIOD: 1/2/2006 to 12/31/2008

OBJECTIVES:

The main goal of this study is to investigate the mechanism of surface-assisted mercury transformation reactions in the combustor cool zone. To achieve this goal, we will investigate the interaction between $\text{Hg}^0(\text{g})$ and fly ash particles under various post-combustion reaction conditions. Role of fly ash composition (metal constituents, carbon and calcium) on mercury transformation reactions will be investigated and impact of CO , SO_2 , NO/NO_2 and HCl concentration on mercury transformation reactions will also be determined.

ACCOMPLISHMENTS TO DATE:

In our studies we use low concentrations of mercury and because mercury sticks to most surfaces this can lead to large variations in inlet mercury concentration. During this quarter the injection system and reactor system were designed to eliminate this problem. Using this newly designed system we were able to obtain a very repeatable inlet mercury concentration. We are also in process of characterizing ten fly ash samples that were obtained from five different coal-burning power plants

FUTURE WORK:

In the next quarter we plan to complete task 1 and start working on task 2. A brief description of tasks 1 and 2 is given below.

Task 1 – Fly Ash Characterization/Model Fly Ash Preparation:

The characterization of each fly ash sample will include measurement of the bulk composition, specific surface area, adsorption/desorption behavior, crystallography, and

surface coverage. Under this task, the model fly ash (catalyst) to be used in this program will also be prepared and characterized.

Task 2 – Mercury-Oxygen Reactions:

This experimental task is designed to elucidate the role of surfaces in the formation of mercuric oxide from the reaction of $\text{Hg}^0(\text{g})$ with O_2 . Experiments will also be conducted to determine the impact of flue gas composition on mercury oxidation reactions.

LIST OF PAPER PUBLISHED, U.S. PATENT/PATENT APPLICATION(S), CONFERENCE PRESENTATION, AWARDS RECEIVED AS A RESULT OF SUPPORTED RESEARCH:

None, this research project was started in January 2006 and hence it is too early to produce any significant results.

STUDENT SUPPORTED UNDER THIS GRANT:

Ms. Patanjali Varanasi – a Ph.D. Graduate Student