Abstract

Title: **Surface Area, Volume, Mass, and Density Distributions for Sized Biomass Particles**

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OBJECTIVE

This project seeks to characterize the shape and mass for biomass particles. Individual biomass particles will be characterized for their external surface area, volume, and drag coefficient/mass ratios. Analysis methods will be employed using shape and drag information to calculate mass and density distributions for these particles. Results of these measurements and analyses will be validated by independent mass measurements using a particle weighing and counting technique. Cofiring of biomass and coal has been identified as a promising way of reducing net CO_2 emissions with minimum modifications in the existing technologies. The successful accomplishment of the above objectives will provide detailed particle property data required for developing improved combustion kinetic models for technologies involving cofiring of coal and biomass feedstocks.

ACCOMPLISHMENTS TO DATE

In this abstract, the work performed under DOE Grant No. DE-FC26-04NT42130 during the period July, 2004 to June 2005 which covers the first one year of the project is described and the major accomplishments are highlighted summarizing the most important research results. Presently work is in progress to characterize surface area, volume, mass, and density distributions for sized biomass particles. Supply requests were processed and supplies including biomass test particles (hardwood sawdust AI14546) in the size range of 100-200 microns were obtained from a cofiring pilot plant research facility owned by Southern Company, Birmingham, AL. Morehouse has completed setting up of the gravimetric technique in the heat transfer laboratory, department of physics and dual degree engineering, Morehouse College. This involved setting up a microscope, a grid surface to disperse several hundred biomass particles for counting under the microscope, and a sub-milligram balance for weighing the particles. Simultaneously, REM, our subcontractor, has completed setting up of the electrodynamic balance (EDB) measurement to characterize shape and mass for individual biomass particles. This involved installation of top, side video cameras, and imaging systems, and alignment of optics and He:Ne lasers for characterizing very small particles individually. Also, calibration of the cameras and imaging systems was completed during this performance period with known sizes of polystyrene particles. **FUTURE WORK**

Counting and weighing of several thousand biomass particles to obtain mean mass per particle is expected to be completed in the next year. Also, statistically significant number of individual biomass particles will be caught in the EDB and raw data for their shape and mass will be obtained. Close to 75% of the data collection proposed in this project is planned to be obtained by the end of the second performance year of the project.

LIST OF PAPER PUBLISHED

R. Sampath, R. M. Dixon, M. D. Young, and G. Weirko-Brobby, Surface Area, Volume, Mass, and Density Distributions for Sized Biomass Particles, 2005 University Coal Research / Historically Blck Colleges and Universities and other Minority Institutions Contractors Review Meeting, sponsored by NETL/U.S. DOE, June 7-8, 2005, Pittsburgh, PA.

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