TECHBRIEF

ROTATIONAL MECHANICAL GAS SEPARATOR

OPPORTUNITY:

This invention describes a technology for separating liquid and solid phase substances from a gas stream. This technology is available for licensing and/or further collaborative research from the U.S. Department of Energy's National Energy Technology Laboratory.

CHALLENGE:

The removal and sequestration of carbon dioxide (CO_2) from gas streams has been extensively researched, and many methods of separating CO_2 have been proposed. These include adsorption monoliths, membrane absorption and cryogenic distillation, but such methods require special materials and/or high maintenance. Other state-of-the-art removal techniques, such as centrifugal stratification, compress CO_2 into a liquid or solid phase, then remove it from the gas stream. But during removal, the liquid/solid phases travel through flow fields and their viscous heating effects. This causes the liquid/solid phases to re-vaporize, stymieing separation efforts.

OVERVIEW:

NETL researchers have developed a system that successfully addresses these challenges by accelerating solid CO_2 to supersonic speeds and passing it through a carefully designed oblique shock train. Then, a mechanical separator collects the CO_2 particles after they pass through the oblique shock diffuser. Formerly, the CO_2 solidification process and the mechanical separation process took place in two distinct processes. However, this NETL invention describes an apparatus that can be constructed such that both the expansion process and the oblique shock compression process can be combined with the mechanical separating process to form a single unit.

ADVANTAGES:

The major advantage to this technology over existing approaches is the fact that the supersonic expansion, the oblique shock compression and the mechanical separation are combined in a single unit. This design allows for a smaller footprint.

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APPLICATIONS:

Any application requiring the separation of particular gas components out of a multi-component gas stream would benefit form this technology. This would include a wide range of applications, but a current area of focus is the separation of the CO_2 component from gas streams of power generation equipment.

PATENT STATUS:

U.S. Patent Pending (non-provisional patent application)

Filed: 03/12/2019

Title: Rotational Mechanical Gas Separator

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NETL Reference No: 16N-07

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