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Moveable Panel for CO2 Capture

The need for technologies to remove carbon dioxide (CO2) from ambient air has been well established. In addition to conservation, reduced-carbon processes, and on-site capture efforts, a significant amount of CO2 will need to be removed from the atmosphere to avoid a looming climate change crisis. Nevertheless, the technologies are still new and the early air captures processes require large amounts of energy to operate. Since the CO2 in the ambient air is very dilute, atmospheric CO2 collectors can quickly overrun a tight energy budget for drawing in and processing air in bulk.

A promising technology that is well adapted for capturing dilute atmospheric CO2 in an energy efficient manner is passive direct air capture, or passive DAC, which is distinguished from other DAC technologies which require additional energy for the forced convection of air. Air contactor surfaces that comprise sorbent materials are exposed to passive atmospheric air flows, capturing CO2 with the sorbent material to be released within an appropriate context for further processing, use, and/or storage. One difficulty in the creation of passive DAC systems is increasing capture capacity and speed while reducing the cost to build and operate, endeavors that sometimes pull in opposing directions.

Researchers at Arizona State University have developed a moving sorbent panel system for the passive collection of carbon dioxide (CO2). This system improves on conventional direct air capture (DAC) systems by increasing the scale of the capture portion of the system without requiring an equal increase in the scale of the more expensive harvest portion of the system.

Capture panels repeat a circuit on a track, exposed to natural air currents. The panels are CO2-laden by the time they reach a harvest house, in which they are enclosed and the captured CO2 is harvested. Such a geometry allows for a larger capture footprint with a minimal harvest infrastructure, allowing a greater volume of CO2 to be captured from the atmosphere over a shorter period of time, at a smaller setup and operation costs than would be incurred by simple scaling up the number of other DAC devices with smaller footprints.

Potential Applications:

- Collection of atmospheric carbon dioxide
- Passive method of carbon dioxide capture

Benefits and Advantages:

- Larger footprint for CO2 capture and harvest
- Reduced operation costs
- System can be adapted for the capture of other gases and/or for use in other environments (e.g., making use of incidental air flows, deliberately forced air

flows, etc.)