Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

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Design and Application of Form Factors for Sorbent Materials

Background

Many current air-capture designs feature flat air contactor surfaces with air flow predominantly tangential to those surfaces. In many cases, it may be advantageous to induce some turbulence across the sheet to enhance transport into the depth of the material. In general, it is advantageous to create surface roughness that is designed to disrupt air side boundary layers and maximize transport of CO2 to the surface itself. This is relevant for any solid sorbent direct air capture system, but particularly important for passive systems relying on wind as the air motive force.

Invention Description

Researchers at Arizona State University have developed novel form factors for structure of sorbent materials used for direct air capture of CO2. These form factors achieve optimal balance of conflicting desired characteristics of maximizing the density of active sorbent and maximizing the specific surface area of sorbent. The form factors consider both capture and regeneration fluid dynamics, and present tailored bidirectional mass transfer characteristics depending on the molecular structure of different solvents. These form factors allow the best capture opportunity and characteristics for a particular solvent, for the flow of air, and for the environment in which the capture device is located.

Potential Applications

- Direct air capture (DAC) sorbents

Benefits & Advantages

- Provides best capture opportunity and characteristics for a particular solvent
- Can be tailored for flow of air and environment of capture device
- Many different configurations available of capture device