

The Critical Role of Porous Materials in Carbon Dioxide Capture from Air, Negative Emissions Technologies and Climate Stabilization

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In parallel with sharp reductions in emissions from fossil energy use, climate models suggest that substantial negative emissions technologies must be developed and deployed to stabilize the climate at <1.5-2°C average warming. Chemical processes that remove CO₂ from the air by adsorption with porous materials, so called direct air capture (DAC) technologies, represent one such approach. Design of effective adsorbent materials requires tailoring of the porosity and binding sites in porous materials, with the ultra-dilute nature of CO₂ in air providing significant materials and process design challenges. The hurdles facing the porous materials designer will be elaborated in this talk, along with insights into the state-of-the art of representative DAC processes today.