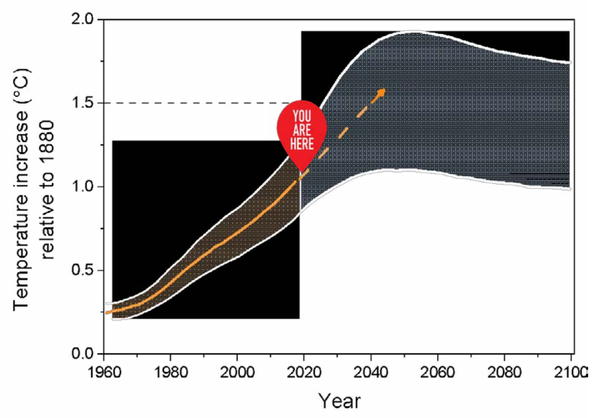
Hannah Holmes

Ph.D. Candidate, Chemical and Biomolecular Engineering
Third Year ARCS Scholar
John and Mary Franklin Award

Georgia Tech

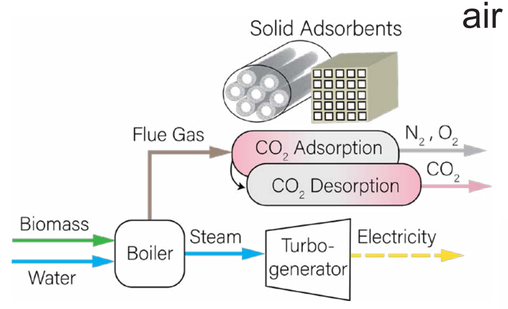
Advancing materials for CO_2 capture

Rising carbon dioxide levels lead to global warming



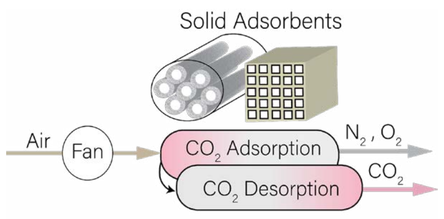
Consequences related to climate, biodiversity, human health, food/water supply, and economy if CO_2 emissions continue at the current rate

Removal of carbon dioxide from power plants and air

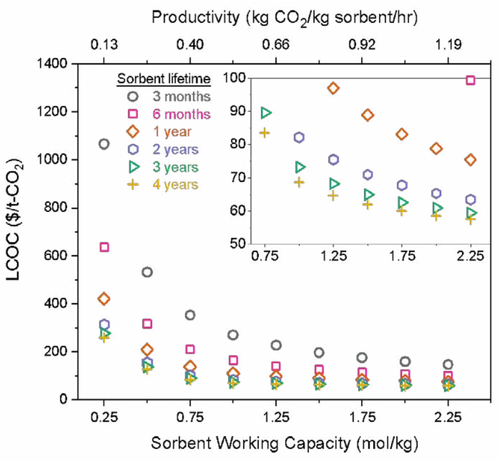


Bioenergy with Carbon Capture & Storage (BEECS) □ burn biomass for energy and remove carbon dioxide from exhaust

Direct air capture (DAC)
□ remove carbon dioxide from atmospheric air



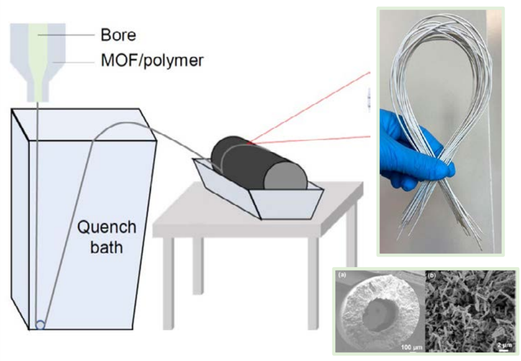
Lowering the cost of carbon dioxide capture



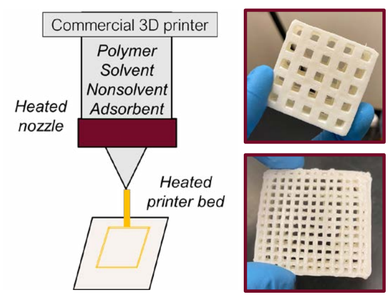
Necessary material properties:

- Long lifetime (high stability)
- High productivity (large amount of CO_2 removed in short time)
- Low energy requirement (CO_2 easily desorbed from material)

Fabrication methods enable various contactor geometries

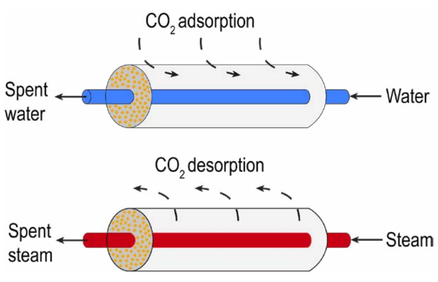


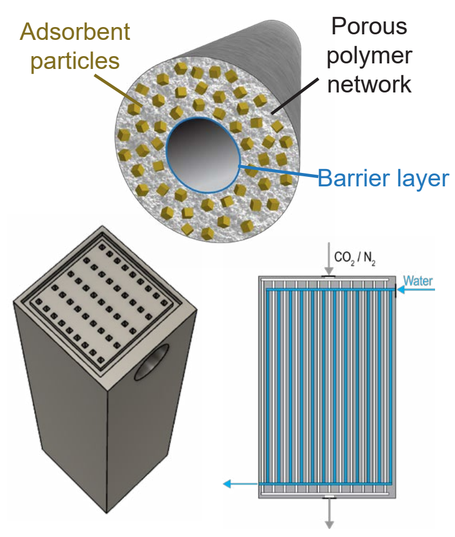
Spinning cylindrical hollow fibers



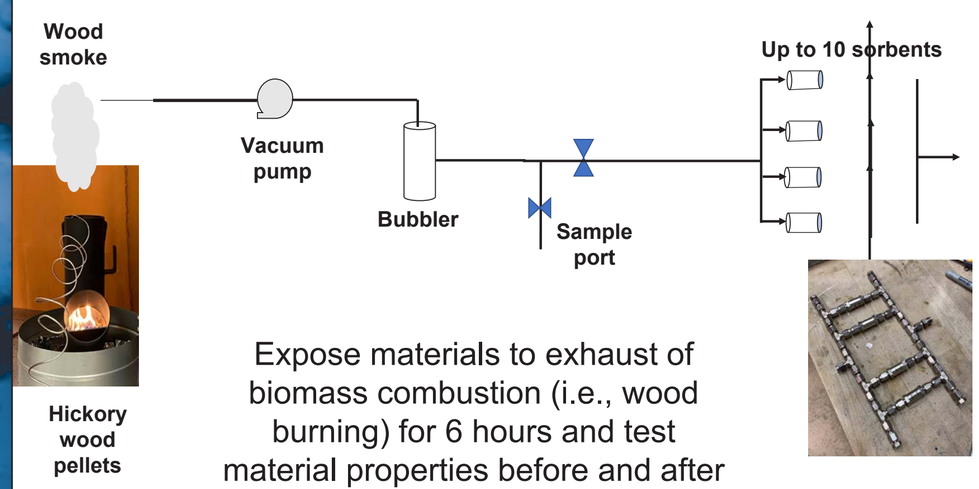
3D printing square channel monoliths

Liquid channels for cooling during adsorption □ increases amount of carbon dioxide removed





Study of material stability



Expose materials to exhaust of biomass combustion (i.e., wood burning) for 6 hours and test material properties before and after exposure

ARCS FOCUS ON THE FUTURE 2022

Scholar Awards Celebration
November 17, 2022