Nanofiber Based Carbon Capture Technology to Reduce the CO₂ Emissions at GSU Campus

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1. Preparation of MOF Solution:

2. Sonochemical synthesis:
Sonication with horn sonicator for 1 hr

3. Centrifugal separation of MOF particles:
MOF solution centrifuged at high speed to separate MOF particles from the solution

4. Preparation of electrospinning solvents:
Solvent-A: PVP Polymer + TiO2 precursor + Ethanol
Solvent-B: MOF particles dispersed in Ethanol solution

5. Electrospinning:
PVP-TiO2 nanofibers attached with MOF particles through innovative bicomponent electrospinning

6. Fabrication of filter canisters:
Cylindrical inserts placed in canister

Motivation:
This is a pilot project to explore the potential of utilizing functional nanomaterials for capturing environmentally detrimental greenhouse gas emissions (GHG), particularly carbon dioxide (CO₂), generated from various sources within the GSU campus. Reduction of man-made or anthropogenic CO₂ is essential in combating the effects of global warming and climate change. This work involves the fabrication of bulk scale adsorbent materials for selective CO₂ capture or adsorption.

Objectives:
- Fabrication of electrospun nanofibrous polymer membranes attached with Metal Oxide Framework (MOFs) for selective adsorption of CO₂.
- Fabrication of filter canisters with nanofibers as filtration media.
- Installation and performance testing of filters at the CO₂ emission sites (automobile catalytic converters, building exhaust stacks) within the GSU campus.