Poly(ionic liquid)-ionic liquid membranes reinforced by graphene sheets for CO_2 capture and conversion in microgravity

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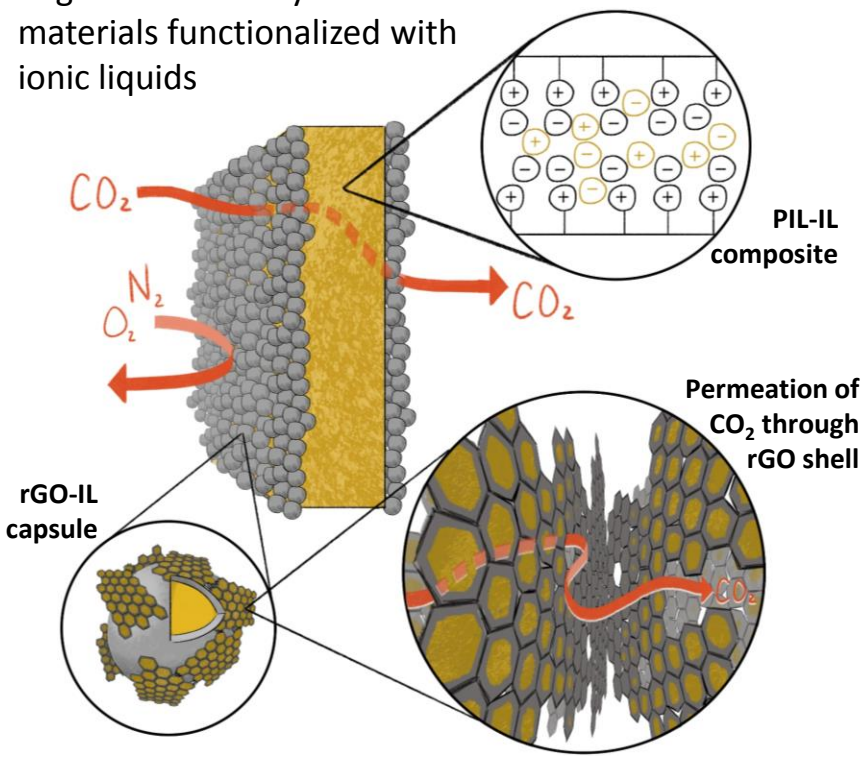
Research Objectives

- Develop a structured ionic liquid membrane for an integrated CO_2 capture and utilization unit
- Drive innovations in design and synthesis of novel solvents, materials and architectures

Removal of CO_2 from air by engineered and layered materials functionalized with ionic liquids



Art Credit: Joseph Williams (Cleveland Institute of Art)

Comparison to State-of-the-Art

Improves CO_2 capacity & flux, eliminates volatility/odor, no dust or leakage, robust recovery

TRL1 to TRL3

Approach

- Synthesis of poly(ionic liquid)-ionic liquid: PIL-IL composite
- Graphene reinforcement (layer of rGO-IL capsules)
- Characterization: morphology, mechanics and CO_2 & water uptake
- Measure of performance: permeability, selectivity, CO_2 flux with water and temperature

Potential Impact

- Integration to NASA's Environmental Control and Life Support System
- Maintenance of healthy CO_2 level in air
- Integration as an end unit to other applications (e.g., passenger vehicles)
- Future potential for O_2 generation from CO_2 at International Space Station