WE CLAIM

1. A method for selectively removing carbon dioxide (CO_2) from a mixed gas, comprising:

(i) contacting said mixed gas to a first side of a facilitated transport (FT) membrane which has affinity for CO_2;

(ii) directing a sweep fluid to remove permeating gases from a second side of said FT membrane, or

(iii) permeating gases from second side of said FT membrane under pressure difference between the feed and the permeate sides, to selectively remove said CO_2.

2. The method of claim 1, wherein said mixed gas is an exhaust gas produced by an internal combustion engine on a mobile device.

3. The method of claim 2, wherein said mobile device is an automobile, a truck, a bus, a motorcycle, a train, an airplane, or a ship.

4. The method of claim 1, wherein said FT membrane has higher selectivity for CO_2 as compared to N_2.

5. The method of claim 1, wherein said membrane has dense homogeneous morphology.

6. The method of claim 1, wherein said membrane has thin film composite morphology.

7. The method of claim 1, further comprising storing said CO_2.

8. The method of claim 1, further comprising knockdown of water from the sweep and/or permeate gas stream mixture.

9. A carbon dioxide separation system comprising:

(i) an internal combustion engine;

WE CLAIM

1. A method for selectively removing carbon dioxide (CO_2) from a mixed gas, comprising:

(i) Contacting said mixed gas to a first side of a facilitated (FT) transport membrane which comprises a polymer having a complexing agent or carrier having affinity for CO_2 incorporated in said polymer and,

(ii) Directing a steam sweep fluid produced by coolant fluid which has become hot via contact with said ICE to remove CO_2 complexed to said polymer from a second side of said FT membrane.

2. The method of claim 1, wherein said mixed gas is an exhaust gas produced by an internal combustion engine on a mobile device.

3. The method of claim 2, wherein said mobile device is an automobile, a truck, a bus, a motorcycle, a train, an airplane, or a ship.

4. The method of claim 1, wherein said FT membrane has higher selectivity for CO_2 as compared to N_2.

5. The method of claim 1, wherein said membrane has dense homogeneous morphology.

6. The method of claim 1, wherein said membrane has thin film composite morphology.

7. The method of claim 1, further comprising storing said CO_2.

8. The method of claim 1, further comprising knockdown of water from the sweep and/or permeate gas stream mixture.

9. A carbon dioxide separation system comprising:

(i) an internal combustion engine;