R&D Needs for DAC Process Configurations

Workshop on Direct Air Capture Technology Needs

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Joshuah K. Stolaroff

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Solvent systems are needed that use low-carbon heat sources.

- Solvent-based capture is great for large scale because it separates ther absorber from the balance of plant.
- But calcining is a huge energy sink and limits the sources of energy.

⇒ Need solvent based process that regenerates at lower temperature.

- ~ 100 C – geothermal
- < 400 C – fresnel solar thermal
- < 600 C – conventional solar thermal

KOH/CaO looping requires heat at 900ºC for the calciner.

Sorbent systems are needed that scale to ~10M t/yr.

- Sorbent systems are great because they are modular.
- But, modularity becomes less advantageous at massive scale.
- Absorber costs dominate because the absorber does everything.
- Can we retain modularity of the sorbent while reaping returns to scale on balance of plant?

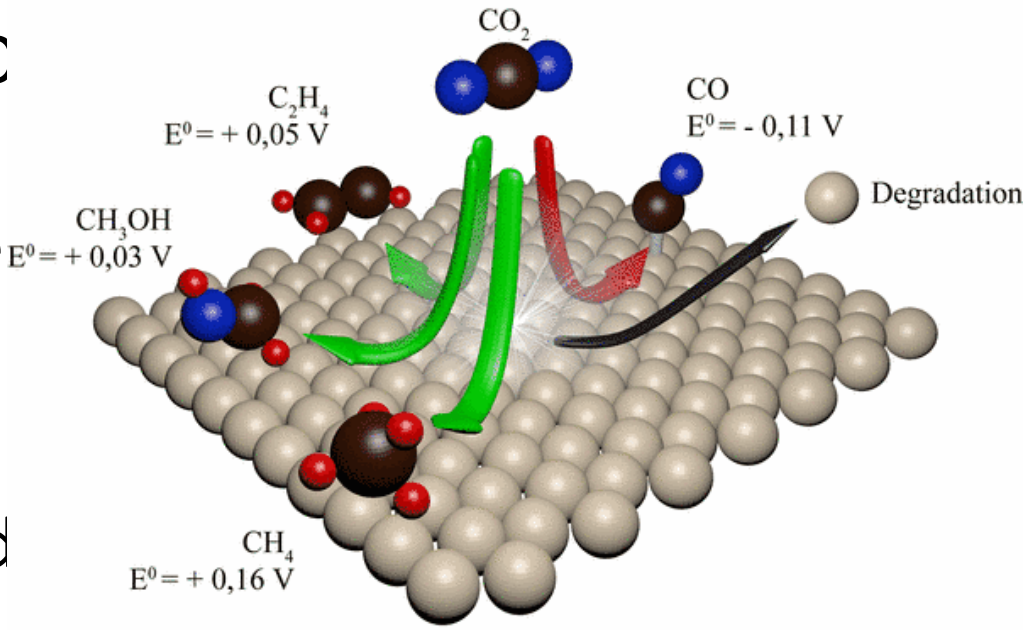
Chevron Richmond refinery:
7M t C/yr of oil

New processes are needed for integrated capture and conversion.

- Air-to-fuel and air-to-products are important components of a carbon negative future.
- Current systems are focused on providing CC gas as the product.
- CO_2 gas is hard to make and not very soluble (for electrochemical conversion)

⇒ Integrated capture-conversion agent would save process steps.

⇒ Catalysts for direct conversion of carbonates / carbamates would help.



Electrochemical CO_2 reduction
Source: Max-Planck Institute