Dioxide Materials Process

Utilization provides a route to carbon storage when no sequestration site is nearby.

CO₂ is an inexpensive carbon source.

- Carbon from CO₂ costs $73/MT
- Carbon from natural gas costs $240/MT
- Carbon from oil costs $770/MT

High Current Densities at Low Overpotentials

Selectivity >99%

How Does It Work?

CO₂ Formation On Silver

\[
\text{H}_2\text{O} \rightarrow 2\text{H}^+ + 2\text{e}^- + \frac{1}{2} \text{O}_2
\]

H₂O → 2H⁺ + 2 e⁻ + ½ O₂

CO₂ + 2H⁺ + 2 e⁻ → CO + H₂O

HCOOH Formation On Tin

\[
\text{H}_2\text{O} \rightarrow 2\text{H}^+ + 2\text{e}^- + \frac{1}{2} \text{O}_2
\]

O₂

CO₂ + 2H⁺ + 2 e⁻ → HCOOH

CO₂ + 2H⁺ + 2 e⁻ → HCOOH
Route to large volume chemicals

A comparison of the projected operating expenses for our process compared to the operating costs of the conventional process for formic acid. Ours is less expensive because we are using inexpensive feedstocks.

A breakdown of the operating costs to produce acrylic acid from propylene and from CO$_2$ and acetylene.

The ARPA-E Program

Add molecules to increase capacity, similar to electrochemical chlor-alkali systems.

Can Also be an Energy Storage Method

Useful For Long-Term Storage Of Energy

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