Efficient Electrolysis of CO2 (Yeda)

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Summary

A simple electrochemical method and apparatus for the continues production of CO (carbon monoxide) from CO2 as chemical storage for electrical energy and a basic material for further organic products. Constant progress is made in solar and wind alternative energy production. Unfortunately, these systems are weather and time-dependent. Additionally, most of the geographic areas best suited for harvesting these resources are remote from population centers. Therefore the need for a reliable method to store and transport renewable energy is clear. CO can be easily converted into methanol, which is one of the major chemical raw materials and can by itself be used as fuel for diesel engines and the energy source for direct methanol fuel cells (DMFC). At present no reliable method of CO2 to CO reduction is available. Either using low temperatures which leads to low thermodynamic efficiency (The current technology describes an efficient, flexible, continues method for production of CO at high temperatures (900oC) without any byproducts or toxic materials.

Applications

- Production of CO from CO2
- Easy conversion into methanol

Advantages

- No precious (Pt, Ag, Au, Pd) metals required
- No hazardous chemicals involved, no pollution
- Continuous operation is possible
- One can use flue gas as a source
- Capture of CO2 from air is possible
- 20 kW/m3
- Operation conditions are very flexible
- The process fits existing infrastructure
- CO can be easily converted into liquid fuel (CH3OH)

Technology's Essence

The outlined technology overcomes the basic problems of CO production by using molten Li2CO3 as the electrolyte, a Ti container (will not undergo corrosion), Ti cathode (does not catalyze decomposition of CO), and a graphite anode (no chemical reaction with Li2CO3). At 900 C and current density of 0.05-2 A/cm2, this unique system enables a thermodynamic efficiency close to 100%, continues production of CO - efficiently separating CO2 to CO and O2.

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