Buffer-Free Process Cycle For Co2 Sequestration And Carbonate Production From Brine Waste Streams With High Salinity

Tech ID: 30294 / UC Case 2018-345-0

SUMMARY

Researchers in the UCLA Department of Civil and Environmental Engineering have developed a novel process cycle to separate and enrich divalent cations such Ca2+ and Mg2+ from high salinity brine solutions for CO2 mineralization.

BACKGROUND

Mineralization is a stable and environmentally friendly method for sequestering CO2, yet the mineralization process is economically challenging due to the large amount of chemicals that it consumes. Furthermore, although brine waste streams possess relatively high amounts of divalent cations such as Ca2+ and Mg2+ that are amenable to carbonation (reacting with CO2 to produce carbonates), carbonation of such streams has not been heavily studied, in part due to the streams' high salinity. Thus, CO2 mineralization that requires minimal chemical input, effectively uptakes desired chemicals from waste streams, and yields high quantities of valuable carbonate byproducts is desirable.

INNOVATION

Researchers in the UCLA Department of Civil and Environmental Engineering have developed a novel process cycle to selectively separate and enrich divalent cations such Ca2+ and Mg2+ from high salinity brine solutions for CO2 mineralization. Unlike mineralization processes which require large amounts of alkaline buffer, the current process allows for critical processing reagents to be recycled, thereby minimizing operational costs. Additionally, the current process serves as a pretreatment for brine waste, which may subsequently undergo further purification. The process does not require energy-intensive material processing steps, and it generates valuable carbonate byproducts with industrial applications ranging from sealants and adhesives to pharmaceuticals and cosmetics.

APPLICATIONS

- Carbon sequestration and utilization
- Treatment of waste streams from desalination
- Treatment of produced water in oil and gas extraction
- CO2 emissions reduction in power plant flue gas
- Production of carbonates for use in construction, chemistry, paper, sealants/adhesives, cosmetics, pharmaceuticals and food industries

ADVANTAGES

- Simultaneously mineralizes CO2 and pretreats brine waste for further purification
- Does not require energy-intensive material processing steps
- Allows for critical processing reagents to be recycled
- Minimizes operational costs
- Generates valuable carbonate byproducts with a wide range of industrial applications

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,827,542	11/28/2023	2018-345
United States Of America	Issued Patent	11,040,898	06/22/2021	2018-345

CONTACT

UCLA Technology Development Group
ncd@tdg.ucla.edu
tel: 310.794.0558.

INVENTORS

- Sant, Gaurav

OTHER INFORMATION

KEYWORDS

CO2 capture; CO2 storage; CO2 sequestration; CO2 mineralization; brine waste stream; divalent cations; carbonate byproducts

CATEGORIZED AS

- **Environment**
  - Other
  - Remediation
- **Engineering**
  - Engineering

RELATED CASES

2018-345-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Method For Mitigation Of Alkali-Silica Reaction In Concrete Using Chemical Additives
- Inorganic Admixtures for Preventing Conversion Phenomena in High-Alumina Cements
- Facile, Low-Energy Routes for the Production of Hydrated Calcium and Magnesium Salts from Alkaline Industrial Wastes
- Controlled And Efficient Synthesis Of Inorganic-Organic Composite Cementation Agents With Enhanced Strain Capacity

UCLA Technology Development Group

10889 Wilshire Blvd., Suite 920,Los Angeles,CA 90095

tdg.ucla.edu

Tel: 310.794.0558 | Fax: 310.794.0638 | ncd@tdg.ucla.edu