

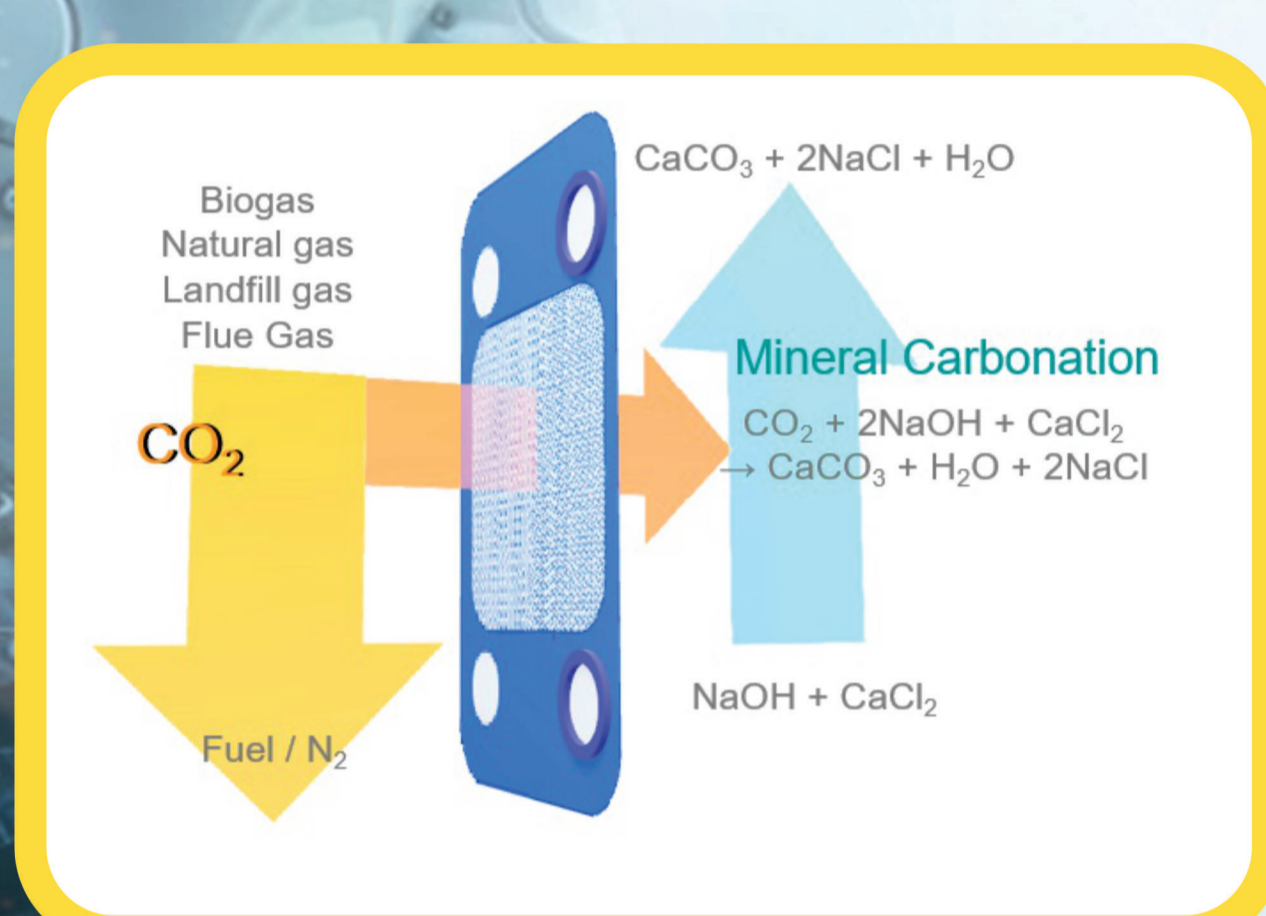


Researchers:

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**INTELLECTUAL PROPERTY:**  
**TRADE SECRET (TS/IO/2020/087)** ◀

# Carbon+ Calcium Generator for Carbon Capture, Storage and Use



## CARBON+ CALCIUM GENERATOR

• A membrane system that allows the capture of carbon dioxide into calcium-rich solution for generating calcium carbonate nanoparticles.

## PROBLEM STATEMENT

• The carbonation of calcium-rich waste is limited by the interfacial resistance in gas-solid and gas-liquid reactions.

## NOVELTY AND INVENTIVENESS

- Carbon+ calcium generator boosts the interfacial reaction between carbon dioxide and calcium ions by incorporating superhydrophobic membrane
- The superhydrophobic membrane was developed to offer a large surface area for the contact between the gas phase and the liquid phase, enhancing carbon capture and carbonation simultaneously.

## Other Advantages

- Simultaneous purification of biogas, natural gas and flue gas
- Low pressure and temperature
- Minimum fouling
- Continuous carbonation
- Waste to wealth

## INTELLECTUAL PROPERTY (IP) STATUS

• Trade Secret (TS/IO/2020/087)

## USEFULNESS AND APPLICATION

Carbon+ calcium generator can be scaled up for

- Biogas plants
- Natural gas plants
- Power plants,

Calcium carbonate nanoparticles are useful in

- Construction and building industry
- Paper industry
- Paint and coating industry
- Biomedical industry
- Agriculture.

## STATUS OF INVENTION

• TRL3

## COMMERCIAL POTENTIAL

- Carbon+ Calcium Generator can produce calcium carbonates without using mines of marble/dolomite/chalk from the limited quarries
- Calcium carbonate market: USD\$ 21.2 billion
- Commercial price of calcium carbonate: USD\$ 50 – 500/ton
- Specialty price of calcium carbonate: nanoparticles is priced up to \$100/kg depends on particle size and surface area)

## POTENTIAL PARTNERS

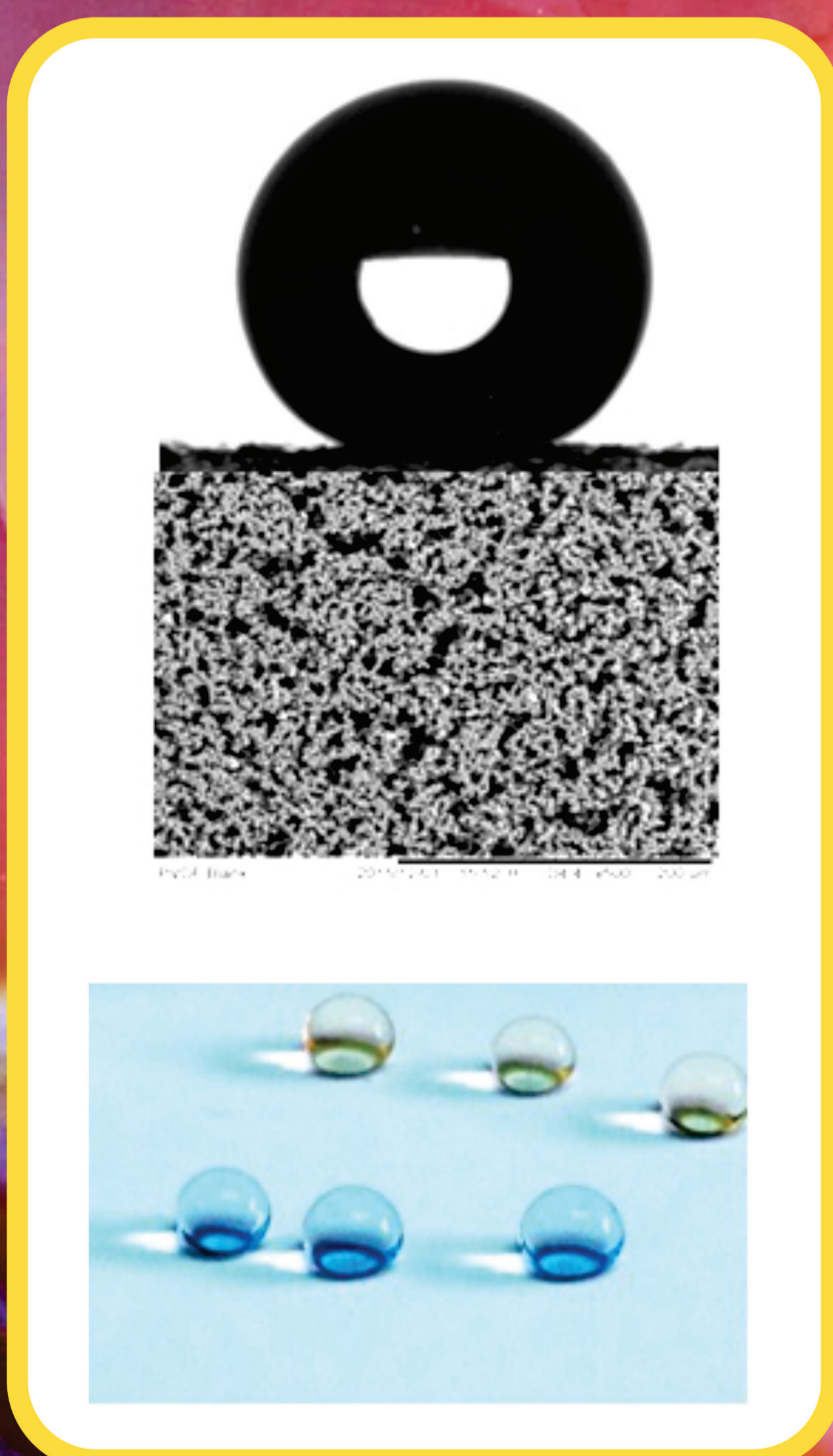
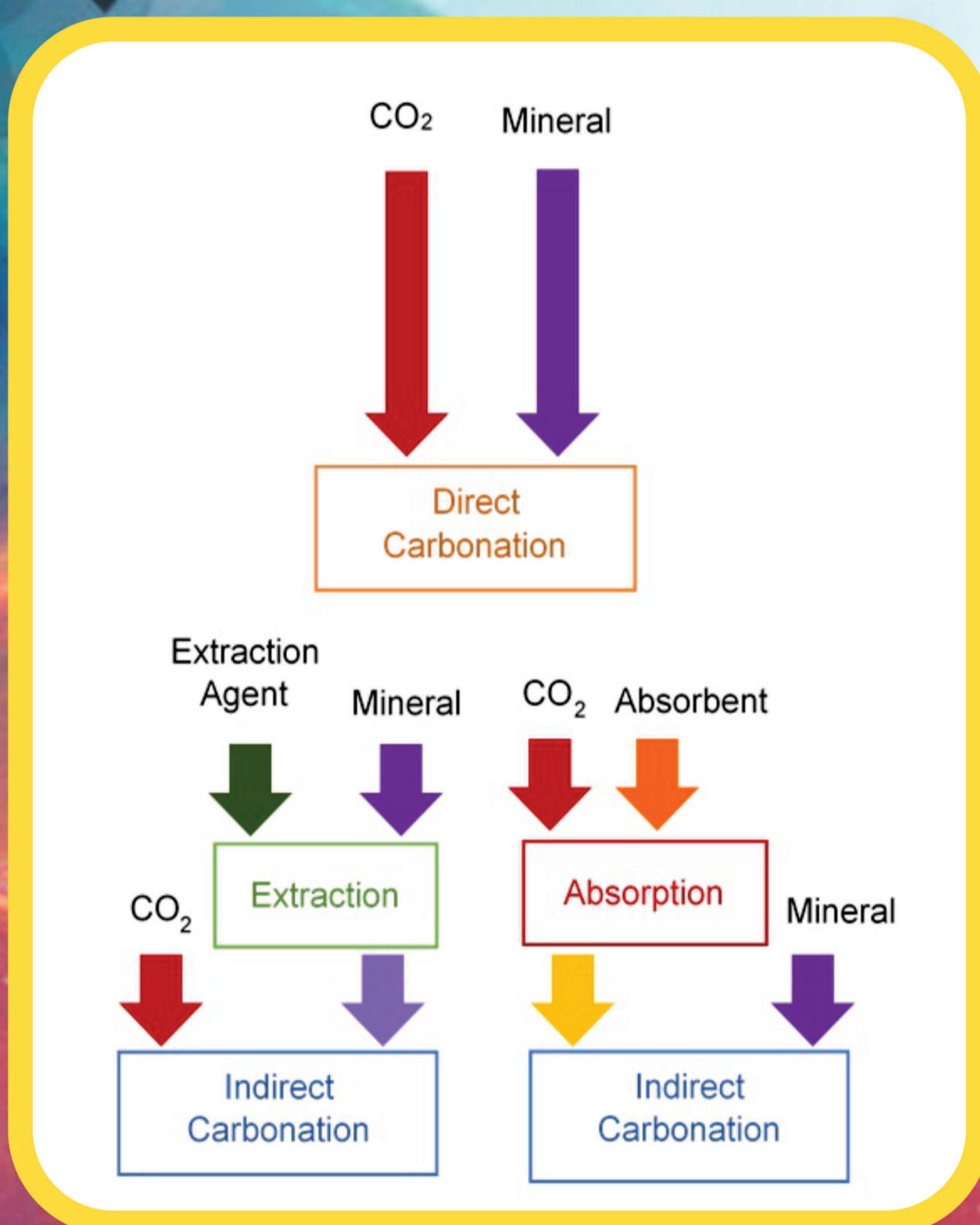
• Sime Darby

## KNOWLEDGE MANAGEMENT

- Grants: UKM-Sime Darby, FRGS and RU
- Publication: 13 ISI-indexed papers

## IMPACT OF THE PRODUCT

- SDG 13 Climate Change: Reduce 45 % of carbon emission
- SDG 07 Affordable and Clean Energy: Upgrade biogas into biomethane
- SDG 03 Clean Water and Sanitation: Convert 141.5 million m<sup>3</sup>/day of brine waste
- SDG 05 Sustainable cities and communities: Produce green concrete
- SDG 09 Industry, Innovation and infrastructure: Sustainable industrialization for the least developed country



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