



Self-Regenerative Ni-Doped CaTiO₃/CaO For CO₂ Capture And Utilization

Tech ID: 33607 / UC Case 2024-705-0

PATENT STATUS

Patent Pending

FULL DESCRIPTION

Background

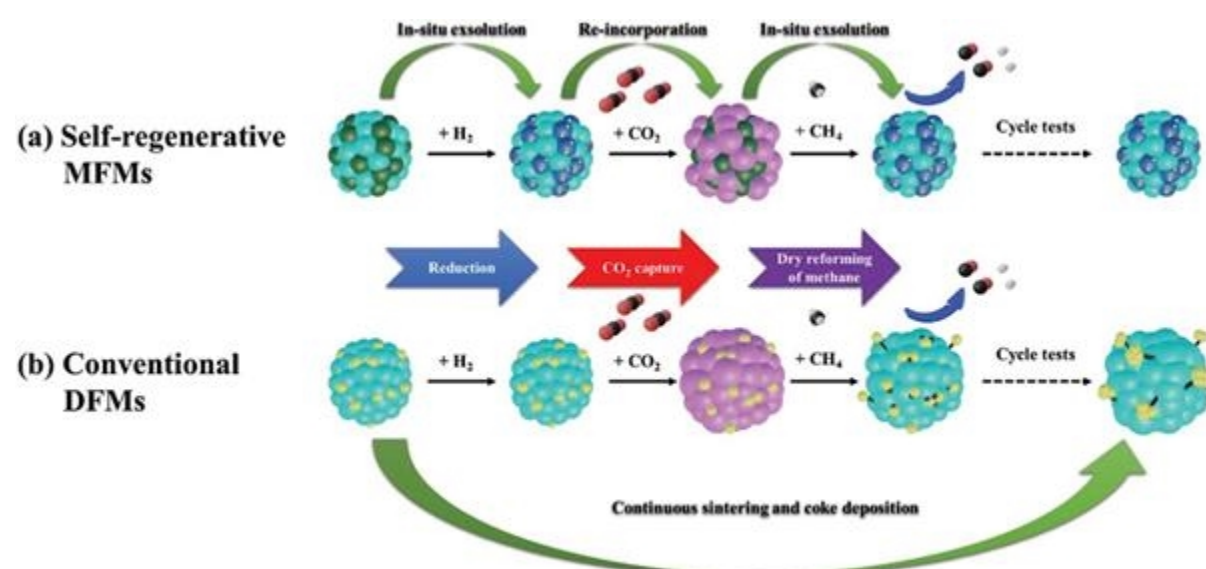
Integrated CO₂ capture and dry reforming of methane (ICCDRM) is a process that tackles two important greenhouse gases - CO₂ and methane (CH₄) - transforming them into useful syngas. Nickel/Calcium Oxide (Ni/CaO) based dual functional materials (DFM) are widely evaluated for integrated CO₂ capture and utilization (ICCU), especially in processes like dry reforming of methane (DRM), where CO₂ and CH₄ are converted into syngas. However, these conventional systems face significant challenges resulting in significant reduction in CO₂ capture and overall efficiency of ICCDRM, especially because of:

- ▶ Coke deposition on the Ni catalyst that reduces the efficacy of the catalyst; and,
- ▶ Stability of CaO resulting in pore collapse, surface area loss and/or agglomeration of Ni nanoparticles.

Invention

Prof. Abdul-Aziz and her team at UCR have developed a novel multifunctional material (MFM) designed to enhance the efficiency and stability of ICCDRM processes. The team successfully synthesized Ni-doped CaTiO₃/CaO nanocomposite, addressing key challenges associated with conventional Ni/CaO systems. The MFM effectively addresses the limitations of conventional systems, showcasing its potential for practical applications in carbon capture and utilization.

Images



Schematic representation of the ICCDRM process

CONTACT

Venkata S. Krishnamurty
venkata.krishnamurty@ucr.edu
 tel: .

OTHER INFORMATION

KEYWORDS

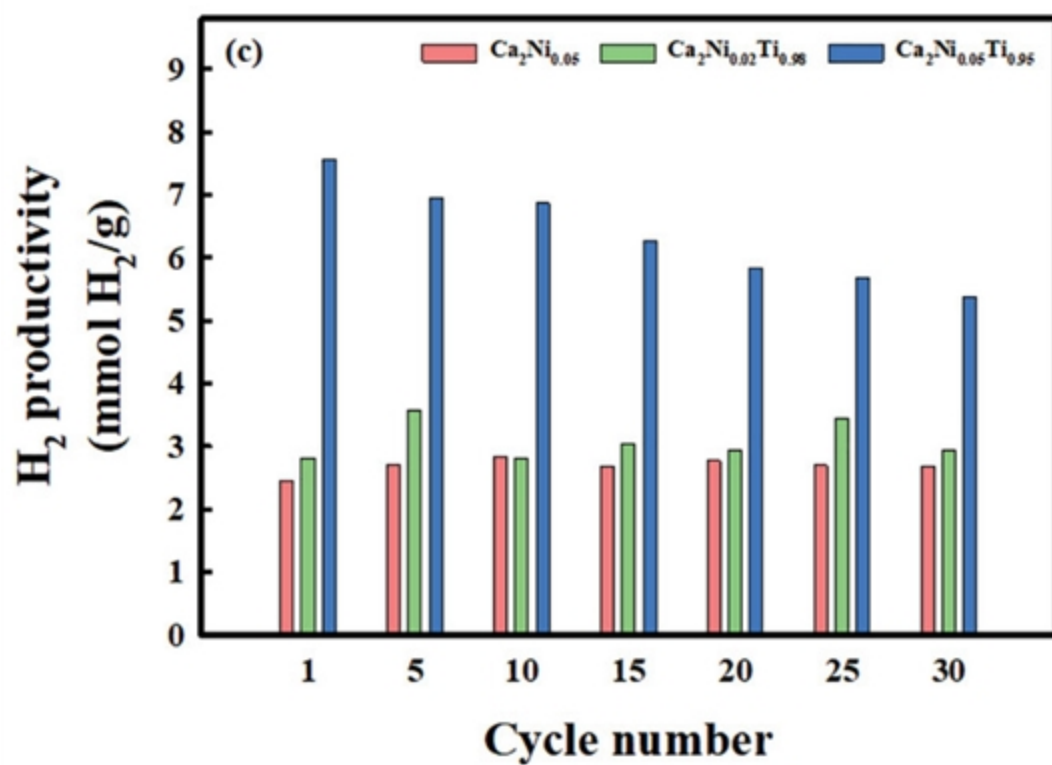
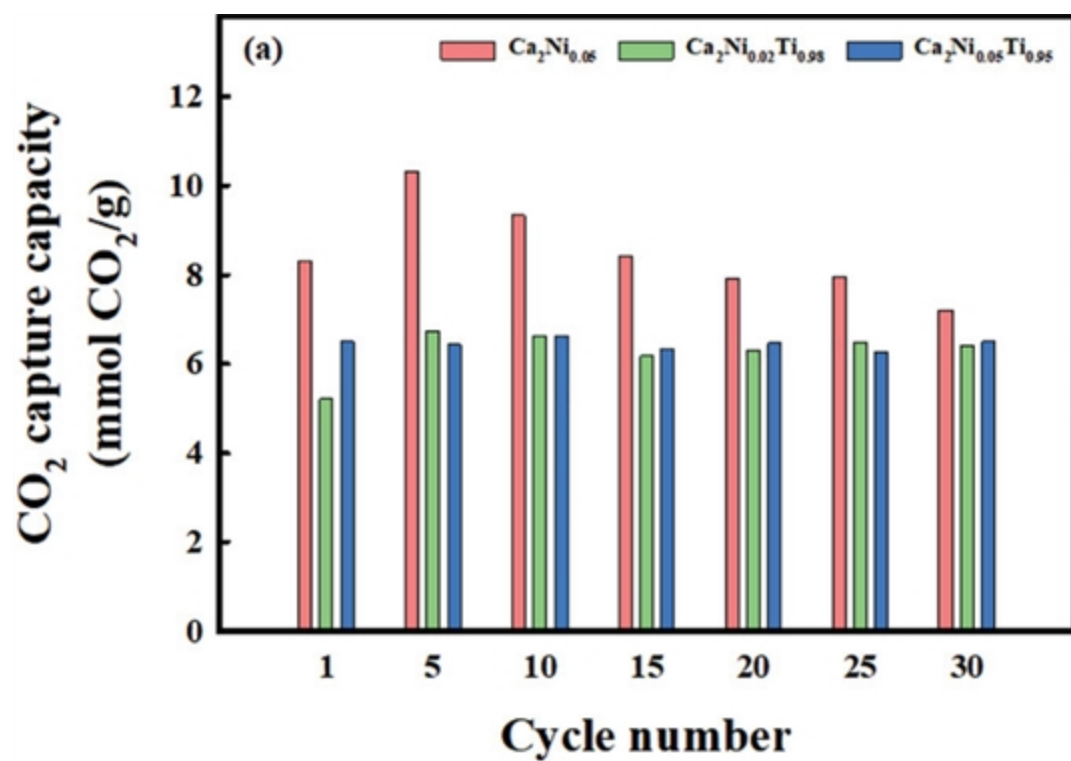
Integrated carbon capture and utilization, ICCU, ICCDRM, dry reforming of methane, DRM, multifunctional materials, syngas, greenhouse gases, GHG

CATEGORIZED AS

- ▶ **Energy**
 - ▶ Hydrocarbon
- ▶ **Environment**
 - ▶ Remediation
- ▶ **Materials & Chemicals**
 - ▶ Chemicals
- ▶ **Nanotechnology**
 - ▶ Materials

RELATED CASES

2024-705-0



Comparison of the effectiveness of the MFM in CO₂ and H₂ production.

ADVANTAGES

- ▶ Enhanced CO₂ capture capacity and stability
- ▶ Improved catalytic activity and stability
- ▶ Self-regeneration of Ni nanoparticles
- ▶ Mitigation of coke deposition

SUGGESTED USES

Capture and reformation of greenhouse gases, Carbon Dioxide and Methane - and the conversion to valuable syngas.

INVENTOR INFORMATION

Please read the [recent press coverage](#) on Prof. Abdul-Aziz's inventions

Please learn more about all of [Prof. Abdul-Aziz's inventions](#) at UCR

RELATED MATERIALS

- ▶ [Self-Regenerative Ni-Doped CaTiO₃/CaO for Integrated CO₂ Capture and Dry Reforming of Methane](#)

University of California, Riverside

Office of Technology Commercialization

200 University Office Building,

Riverside, CA 92521

otc@ucr.edu

research.ucr.edu/

[Terms of use](#) | [Privacy Notice](#) | © 2024, The Regents of the University of California