

Bioinspired green method for mesoporous silica

Technology invention

We have discovered a reproducible, sustainable alternative route to mesoporous silica at room temperature, neutral pH and within minutes. This overcomes the barriers of existing methods and unlocks manufacturing for mesoporous silica.

Overview

Bioinspired silica (BIS) technology (WO/2017/037460) offers rapid synthesis and simplicity, enabling faster, greener manufacture of silica compared to current TEOS and surfactant based methods. This invention (GNRG-03) enables imprinting (semi)ordered mesoporous features into the materials with a controllable pore size.

Market Potential

Mesoporous silicas are well known to exhibit a diverse range of physicochemical properties, enabling the materials to host chemical reactions, separations, and guest molecules. This has led to potential applications of mesoporous materials as CO₂ sorbents for large point sources (e.g. power plants), use as next-generation targeted drug delivery systems, and as (bio)catalyst supports enabling shape-selective or cascade reactions. However, despite these and many other areas of potential applications, commercialisation of traditional methods/ materials (e.g. MCM-41) has not been achieved to date at large scales.

Technology Description

GNRG-03 invention uses a 2-step BIS synthesis method. The pore sizes are controlled by the process conditions. GNRG-03 technology is rapid (takes only minutes) and operates at room temperature, in water and at neutral pH.

Advantages

- A room-temperature technique that is inherently sustainable and economical.
- It avoids all drawbacks of calcination-based techniques typically used in making materials such as MCM-41 frameworks.

- This is the first report of synthesis of mesoporous silica that does not require large energy inputs unlike traditional mesoporous silica syntheses (Low OPEX).
- GNRG-03 involves only common industrial chemicals and processes, avoiding typical practical issues.
- Potential for minimal infrastructure changes or retrofitting existing processes (Low CAPEX).
- It has the potential of large scale production in both continuous and batch processes.

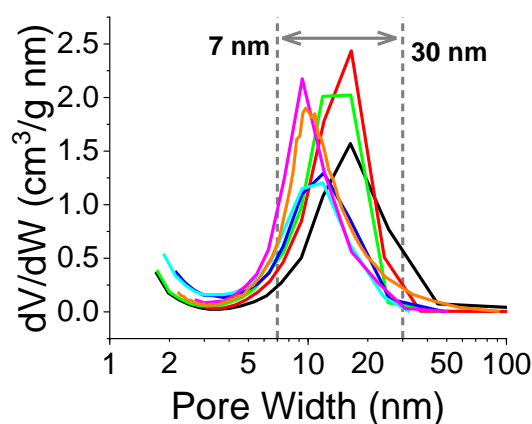


Figure 1 – Pore size distribution of mesoporous BIS can be controlled between 7-30 nm range.

Material properties

GNRG-03 technology enables a variety of porous properties to be produced in a highly reproducible fashion. Pores between 7 and 30 nm can be easily targeted by tuning process (Figure 1).

Technology Status

This technology currently operating at technology readiness level 2 and patent application is in preparation. Know-how is available to support the exploitation of the invention and any subsequently produced IP in collaboration with a chosen industrial partner.

Contact

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