

Green Route for Silica Manufacture

Technology invention

The University of Sheffield (TUoS) has developed and patented a green route (*GNRG-01*) that provides a novel, sustainable alternative process to manufacture different precipitated and highly dispersible silica grades suitable for applications ranging from rubber to pharmaceuticals.

Inspired by nature, the *GNRG-01* stems from an unmet demand for a flexible process for high quality precipitated silica with lower environmental impact.

The process enables precise control of silica properties such as porosity and compatibility with formulations.

Market Potential

The global precipitated silica market is projected to grow at a CAGR of 9.1% between 2016 and 2021. Presently, 100 % of the global precipitated silica market is supplied using chemical and energy intensive processes.

The *GNRG-01* process is a rapid reaction performed in water at room temperature that incorporates an amine-containing additive into the synthesis, greatly accelerating reaction times, lowering energy requirements, and providing greater structural control, leading to precise material properties. The technology also includes a complete removal and reuse of the additive.

Techno-economic analysis indicates that the *GNRG-01* can reduce the energy usage of the reaction step by ~95% when compared with a conventional precipitation process and the product could cost the same as the lowest grade commercial counterparts, yet provide significantly better quality and properties such as mesoporosity.

Value/Advantages

The value proposition of this technology is:

1. Improved control over silica properties (internal surface area, porosity, particle size) to meet specific, high value applications.
2. Reduced energy and environmental burden.
3. Low capital cost due to potential for minimal changes to existing processes.
4. Proven potential for continuous operation.

Technology Status

The *GNRG-01* is currently operating at lab-scale at around technology readiness level (TRL) 3-4.

We have proven production and scale-up of the process up to 200 g/day and demonstrated production at large scale in both continuous and batch processes.

We have also positively addressed industrial feedback regarding the industrial implementation of the technology including:

- Using diverse silicate and acid sources,
- Increasing production rates, and
- Recycling and waste minimisation.

Technology Offer

We are on the lookout for potential partners with clear intent to invest in the *GNRG-01* process. We are open to a wide range of technology development models (licensing agreements, joint development and spin-out transaction).

The offer would constitute one patent (WO/2017/037460) along with associated trade secrets and know-how.

There are a number of new developments and trade secrets in the pipeline such as developing various grades of silica for wide ranging applications and the mesoporous silica technology. These are open for discussion and licencing if the business case supported it.

Contact

For further information or to discuss this, please contact Professor S. V. Patwardhan at s.patwardhan@sheffield.ac.uk.