Materials & Chemicals

Coating Extends Life of Catalytic System

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WARF: P140345US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method for improving the performance of catalyst support structures under hydrothermal and other hostile reaction conditions.

Overview

Biomass processing and many other industrial catalytic reactions are performed in hot, liquid conditions. These hydrothermal reactions may be carried out at elevated temperatures (e.g., 200 degrees C) and pressures (e.g., 400 psi) in the presence of water or steam.

Such harsh conditions take a toll on catalyst support structures, which can collapse and cause system failure. These structures often are made of mesoporous silica materials (MCM-41, SBA-15) that quickly degrade and need to be replaced. A more robust structure would ensure longer term performance.

The Invention

UW–Madison researchers have developed a coating that helps catalyst support structures withstand harsh reaction conditions.

The coating is made of a chemically robust material such as niobium oxide that can be applied in extremely thin layers using a technique called ALD (atomic layer deposition). The coating may be selected purely for its structure-enhancing properties, or may comprise materials that are themselves catalytically active.

Applications

- Catalyst manufacturing
- Biomass conversion

Key Benefits

- Enhances structural integrity/catalytic activity
- Improves long-term performance
- Commercially viable

Stage of Development

The researchers have demonstrated superior catalytic activity using mesoporous niobia material as an acid catalyst for the gas-phase dehydration of 2-propanol and for the gas/liquid-phase dehydration of 2-butanol. The incorporation of palladium nanoparticles improved [illegible] conversion processes.

Additional Information

Related Technologies

- WARF reference number P130079US01 describes a method to stabilize base metal catalysts by coating them in protective film.

Related Intellectual Property

- View Continuation Patent in PDF format.

Publications

- Pham H.N., Pagan-Torres Y.J., Serrano-Ruiz J.C., Wang D., Dumesic J.A. and Datye A.K. 2011. Improved Hydrothermal Stability of Niobia-Supported Pd Catalysts. Appl Catal A-Gen. 397, 153-162.

Tech Fields

- Clean Technology : Biobased & renewable chemicals & fuels
- Materials & Chemicals : Metals

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854