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Battelle Number(s):

12073

Patent(s) Issued

Available for licensing in all fields

Available Technologies

Textured Metal Catalysts for Heterogeneous Catalysis

SUMMARY

Textured metal catalysts combine the advantages of both carbon supported and metal oxide supported catalysts for heterogeneous catalysis in aqueous systems. This combines the surface area of carbon catalysts with the metals retention and support effects of metal oxides, while avoiding the low surface area and water instability of traditional metal oxide supports as well as blocking access to the micropores of carbon supports that can sometimes lead to overreaction to unwanted byproducts. These catalysts may bring additional efficiency to various applications where water-based processing methods are needed, such as in bioproducts manufacturing.

Metal oxides can be used to support catalytically active metals; however many traditional catalyst systems that use catalytic metals dispersed on metal oxide supports quickly degrade when water is involved. And activated carbon supports work well in aqueous systems, but some of the tremendous surface area is present in the form of small micropores which can lead to overreactions or the formation of byproducts when some of the reactants become diffusion limited. This can have a similar effect to an edge-coated catalyst but with the additional benefit of interactions with a metal oxide support layer.

Textured metal catalysts employ a water-stable metal oxide layer on the outside surfaces of a carbon support, blocking access to those micropores and yielding a hybrid support that has the surface area and water stability of carbon and the functionality of a metal oxide support surface that doesn't degrade in the presence of water.

ADVANTAGES

* High surface area

* Structurally stable

* Better anchoring—or improving activity and retention of—metals involved in the process

* Reduces overreaction and byproduct formation by blocking access to micropores

* Highly effective for aqueous phase hydrogenations

U.S. DEPARTMENT OF ENERGY

Patents & Intellectual Property

- Patent #: 7,186,668
- Patent #: 6,670,300
- Patent #: 7,776,782

Technology Portfolio(s)

- Chemical Processing and Catalysis

Potential Industry Applications

- Chemicals

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