

Coupling Catalyst

Highly Active Graphene Based Palladium Catalysts

Palladium (Pd) catalysts are highly sought after for the production of various materials in the pharmaceutical and organic chemistry industries. Catalyst support on graphene materials has shown tremendous promise for improving catalytic activity. Pd nanoparticles supported by graphene defects have been shown to improve catalytic activity in many hydrocarbon coupling reactions, such as Suzuki and Heck reactions and hydrogenation.

The technology

Researchers at Virginia Commonwealth University have designed a new palladium catalyst manufacturing method by combining strong electrostatic adsorption for directed ionic Pd precursor uptake with a new solvent less microwave irradiation method to simultaneously form Pd nanoparticles and graphene defect sites. With this method, Pd nanoparticles are secured within holes in graphene sheets that significantly improve catalytic activity, prevent leaching, allow for easy recovery/recycling, and ensure stability in ambient conditions. Testing showed that this manufacturing method results in 10x greater catalytic activity compared to common substrates. Unlike traditional Pd catalyst manufacturing methods, this novel method does not require the use of harsh chemical solvents.

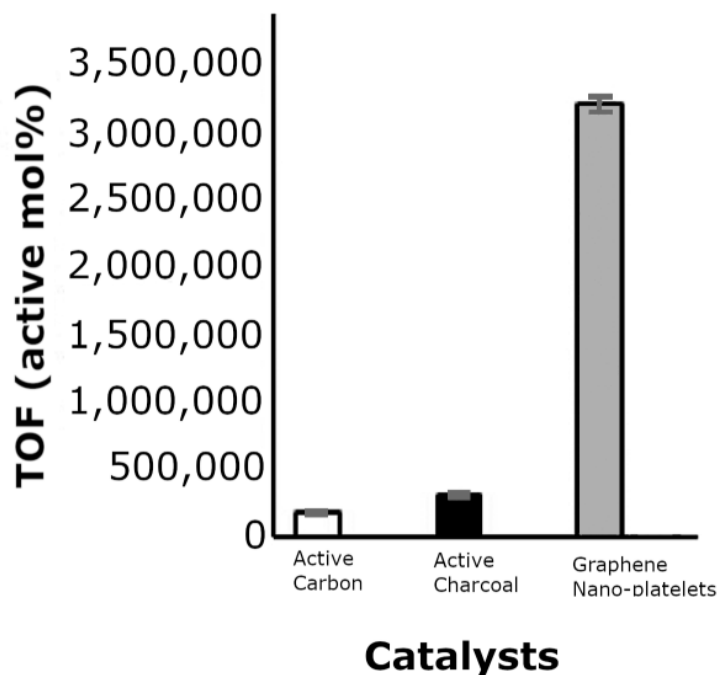


Figure 1. TOF mass spectrometry of Palladium catalyst activity, comparing this work using graphene nano-platelets with common commercial active carbon and active charcoal substrates

Benefits

- » 10x more active compared to traditional substrates
- » Stable in ambient conditions for over 1 year
- » Little to no leaching
- » Recoverable and recyclable
- » No solvents required
- » Uses cost effective graphene nano-platelets

Applications

- » Organic chemical synthesis
- » Pharmaceutical manufacturing
- » Fuel cell catalyst
- » Fine chemical manufacturing

Patent status:

Patent issued: U.S. rights are available.

License status:

This technology is available for licensing to industry for further development and commercialization.

Category:

Engineering and Physical Science

VCU Tech #:

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External Resources:

[US10661251B2](#)
[US11219892B2](#)
[Gilliland et. al. \(2018\)](#)

Contact us about this technology

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