

# REDOX-ACTIVE METAL-ORGANIC FRAMEWORKS FOR THE CATALYTIC OXIDATION OF HYDROCARBONS

Tech ID: 23844 / UC Case 2014-098-0

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,058,855	08/28/2018	2014-098

## BRIEF DESCRIPTION

The selective and efficient conversion of light alkanes into value-added chemicals remains a challenge for those in the petrochemical and chemical industries. Currently, there is no go-to commercial process for the selective oxidative conversion of C<sub>1</sub>-C<sub>3</sub> hydrocarbons into value-added chemical feedstocks, such as methanol and ethanol. Industrially, methanol is produced in an indirect and energy intensive process beginning with the steam reformation of natural gas into synthesis gas. After fermentation, ethanol is largely produced from the hydration of ethylene/ethene, which relies on the use of concentrated acids and elevates risk for human safety and environment. To overcome these challenges, researchers at UC Berkeley have devised novel materials and methods involving redox-active metals within porous metal-organic frameworks for driving improved catalytic oxidation of small hydrocarbons to their corresponding alcohols and aldehydes. This innovation could be of special importance to the boom of shale gas processing, which consists of largely methane, but also contains large amounts of ethane and other light alkane impurities.

## SUGGESTED USES

- » Chemical processing
- » Natural gas processing

## ADVANTAGES

- » Greener alternative to traditional approaches in industry
- » Reactions occur in desirable temperature and pressure ranges
- » Leverages industry standard chemical processing platforms

## RELATED MATERIALS

### ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Next-Generation Metal-Organic Frameworks With High Deliverable Capacities For Gas Storage Applications
- ▶ Porous Polymer Networks For Per- And Poly-Fluoroalkyl Substance Separations
- ▶ Selective Carbon Monoxide Uptake via Metal Carbanion Functionalized Metal-Organic Frameworks
- ▶ Structures and Apparatus using Three-Dimensional Linked Networks
- ▶ Gas Separations With Redox-Active Metal-Organic Frameworks
- ▶ Metal-Organic Frameworks For Aromatic Hydrocarbon Separations
- ▶ Novel Porous Organic Polymers for Ammonia Adsorption
- ▶ Isothermal Carbon Capture And Release Of Carbon Dioxide With Molecular Polyamines
- ▶ Selective Nitrogen Adsorption Using a Vanadium Metal-Organic Framework

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## INVENTORS

- » Long, Jeffrey R.

## OTHER INFORMATION

### KEYWORDS

metal organic framework, catalytic oxidation, hydrocarbon, alkanes, methane, ethane, propane, C<sub>1</sub>, C<sub>3</sub>

### CATEGORIZED AS

- » **Energy**
- » Hydrocarbon
- » **Materials & Chemicals**
- » Chemicals

### RELATED CASES

2014-098-0

- ▶ Metal-Organic Frameworks for H<sub>2</sub> Adsorption and Drug Delivery
- ▶ Separation Of 1-Butene From 2-Butene Using Framework Open Metal Sites
- ▶ Phase Change Adsorbents For Storage And Separation Applications



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