



**INVESTIGATION OF EXISTING & DEVELOPMENT OF NEXT GENERATION  
FUEL REFORMING CATALYSTS FOR EFFICIENT ENERGY USAGE**

**SUMMARY OF WORK**  
**AUGUST 2012**

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## Executive Summary – Abstract – August 2012

### FUEL REFORMING CATALYSTS FOR EFFICIENT ENERGY USAGE

#### ENHANCEMENT OF COMBUSTION THROUGH SELECTIVE CATALYSIS OF GASOLINE AND DIESEL FUELS

Upgrading of commercial gasoline and diesel fuel will further enhance US energy resources. Catalysis through chemistry has been greatly involved in improved environmental protection and economic growth. Greater than 90% of today's chemical processes have catalytic steps.

We have completed a series of experiments studying and measuring the ability of a novel catalyst to constructively modify commercial gasoline and diesel fuel. This catalyst has the ability to selectively remove hydrogen and or add oxygen to hydrocarbon components of fuel. The catalyst demonstrated the ability to produce reformed fuel species at room temperature which is novel and provides evidence these catalysts are broadly applicable in fuel applications.

The ability to selectively remove a few hydrogen atoms from specific sites is a key to the enhancement of fuel. Removing and redistributing hydrogen atoms from components of gasoline to produce olefins that can couple to form larger hydrocarbons has been measured. The ability of the same catalysts to introduce oxygen to hydrocarbons to form oxygenates has also been measured.

The combination of these two different reactions result in

- aromatic ring decomposition,
- coupling
- olefin formation, and
- oxygenation

simultaneously which is unique as regards chemical activity, constructive, and leads to enhanced combustion from the hydrocarbon fuel feedstock.

Data from our most recent experiments with small molecules that are model components of fuel have shown that chemical changes occur that involve the production of new types of bonds. These types of reactions have been demonstrated with some of the model fuel components of gasoline, heating fuel oil, and diesel fuel.

Data from combustion experiments demonstrated enhanced useful energy yield per unit of fuel.

This catalyst is marketed under the brand names Fitch Fuel Catalyst, GOSaver and Walker Fuel Sep.