



**Featured Inventors: Matthew Kropf, PhD; Ethan Silver**

## MULTI-FUNCTIONAL PROPPANT

*(Functionalized proppants trap unwanted chemicals underground in hydraulically fractured stratum)*

### Value Proposition

For oil and gas producers who are looking for a way to reduce the cost of spending on environmental and regulatory compliance, the Multi-Functional Proppant is a product that sequesters the contaminants in the flow back water in the well. Unlike, traditional fracturing proppants, our technology reduces the cost and steps of cleaning the frac water flow back.

### Market Opportunity

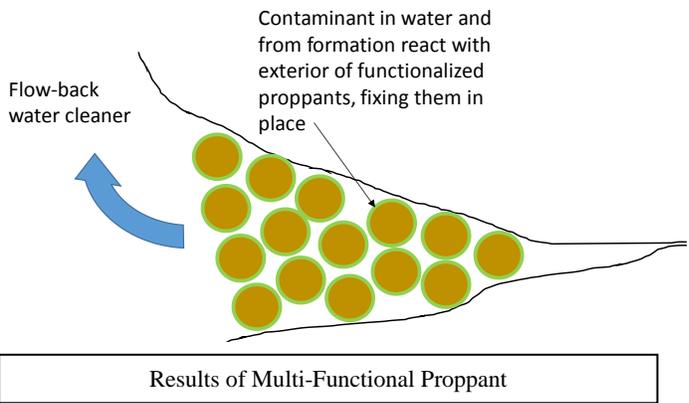
The total proppant market is projected at \$10 billion by 2017 and 19 billion by 2019. 10% or \$1 billion is engineered proppants. In today’s depressed market there are some 481 oil and gas companies conducting hydraulic fracturing, and this number is expected to rise to 1,200 when robust oil and gas process return. A demand not currently being filled is a way to lower or eliminate the cost of cleaning flow back frac water. Not only improving economic returns, but also demonstrating environmental compliance more publically. The market is looking for a proppant that is multi-functional and maintains the desired productivity attributes of a traditional proppant.

### Competitive Landscape

This proppant is a product that prevents the collapse of formation with the additional function of preventing unwanted substances within the flow back water that leaves the well. The competition and current state of proppants is a sand based proppant that only acts as a stabilizer for the well to prevent collapsing. Thus, flow back water returns to the surface with contaminants creating additional costs of transportation, treatment and/or disposal according to environmental regulatory requirements.

### IP Landscape

The technology is currently patent pending with coverage starting with Provisional Patent No. 61/946,464 filed on February 28, 2014 and continued with full US Patent Application No. US 2015/0247083 published on September 3, 2015.



### Technology

The Multi-Functional Proppant is a proppant for hydraulic fracturing that prevents the collapse of formation and has the additional functionality of removing and capturing unwanted substances in the frac water return. Thus, only much cleaner water is leaves the well, reducing the cost and steps to clean the frac water. This proppant can be based on engineered proppants such as ceramic or based on traditional proppants 20/40 mesh silica sand.

### Stage of Development

The current stage of development of the proppant technology is at lab-scale research establishing baseline cost reduction figures of merit. The next step of development is to manufacture the proppant for a pilot scale study and deploy the proppant in a pilot well.

### Funding

Innovation Institute First Gear Program NSF Site - \$3,000

# FEATURED INVENTORS:

## *Ethan Silver*

Current undergraduate student at the University of Pittsburgh; majoring in chemical engineering with a minor in bioengineering and pursuing a certificate in petroleum engineering. He plans to enter the biofuels or the fracturing industries after graduation.

### **Education**

University of Pittsburgh – Sophomore

## *Matthew Kropf, PhD*

Current chairman of sustainability committee on the Pitt-Bradford campus. He attended Rose-Hulman Institute of Technology for undergrad and Penn State for his doctorate. He has been awarded a US Patent and featured in magazines for Biodiesel. Since then he has received another US Patent and published numerous journal articles, book chapters, and presented papers at international conferences based on his research.

### **Education**

Rose-Hulman Institute of Technology - B.S. Physics

Penn State University – Ph.D. Engineering Science and Mathematics

### **Publications**

1. “Proppants for Hydrocarbon Recovery” – 2014
2. “Innovations and Future Direction of Hydraulic Fracturing Proppants” – 2013
3. “Multi-Functional Proppants for Hydrocarbon Recovery” - 2016

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