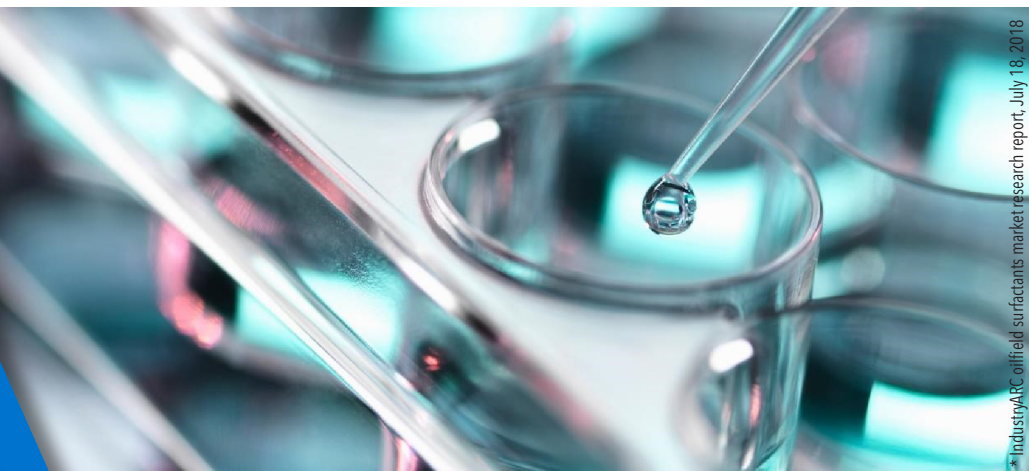


SOY-BASED SURFACTANTS

Partner to commercialize an economical, effective and eco-friendly alternative to today's available surfactants



The global surfactant market is set to grow at about 4.6% through 2023, when it will reach \$1.09 billion.*

Surfactants are essential to enhanced oil recovery. They reduce the surface tension between oil and water in rock formations, making the oil easier to extract. Cationic surfactants are particularly effective for pulling oil out of carbonate formations. However, most of these agents are toxic and costly to manufacture.

Battelle, in partnership with the Ohio Soybean Council, has developed a soy-based alternative and is looking for a commercial partner to license the technology.

Product Benefits

A Reliable and Affordable Supply Chain

Raw materials for synthetic surfactants are often sourced from overseas, sometimes from limited or unstable markets, which leaves supply chains vulnerable to disruption or price instability.

Our surfactant uses soy-based raw materials that can be readily and locally sourced, offering a secure, cost-stable and economical supply chain.

An Environmentally Friendly Alternative

Synthetic surfactants, and cationic agents in particular, present environmental and health concerns.

Our soy-based alternative is derived from non-toxic, generally recognized as safe (GRAS) epoxidized soybean oil or epoxidized soybean oil methyl ester.

A High-Performance Product

Researchers compared the bio-surfactant to commercially used agents.

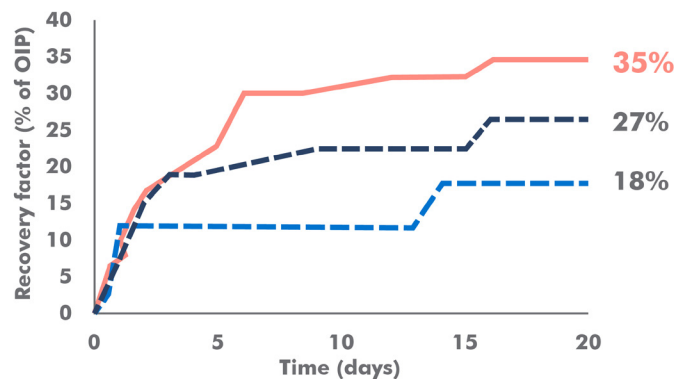
Our product demonstrated good thermal stability, promoted water wetness in reservoir rocks, and recovered more oil than the commercial agents tested.

Partnership Advantages

A partnership with Battelle and the Ohio Soybean Council will provide your company with access to:

- ▶ A versatile chemical platform that can be tailored to meet your company's performance and sustainability needs
- ▶ Our ongoing research in the field
- ▶ Technical and logistical support from a seasoned and diverse team of materials scientists and engineers

Battelle will provide samples for evaluation to commercial enterprises interested in bringing soy-based surfactants to the marketplace.



Oil recovery from spontaneous imbibition as a percentage of oil in place (OIP): soy-based surfactant (coral) vs. two commercial surfactants (blue)

BATTELLE

Airable
RESEARCH LAB
WHERE SUSTAINABLE SOLUTIONS START

Interested parties should contact Barry McGraw
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