

# Polymer-coated nano-particles, composite nano-emulsion and macro-emulsion

Stabilizing higher performance emulsions in harsh conditions at lower cost

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**Polymer self-assembles into a cage-shaped structure to coat the nanoparticles, and the nanoparticles are iron-containing metal oxides.**



**The polymer-coated nanoparticle stabilizes nanodroplets which can combine with aqueous salts to stabilize macro-emulsions at very low concentration.**



**Much lower cost because nanoparticles don't need surface chemical modification. Novel stabilization mechanism enables high stability.**



**National patent filed. Collaboration opportunities: seeking research or licensing partnership.**

## Background

Traditional methods for creating stable emulsions often require high concentrations of surfactants and solid particles, making the process costly and complex. Moreover, synthesizing stable nanoparticles typically involves multiple steps, including covalent linking with expensive crosslinkers and polymers, which can be inefficient and expensive. Many nanoparticles also struggle to maintain stability and uniform distribution in high-salt environments, which limits their effectiveness in various applications.

This new technology introduces polymer-coated nanoparticles, where a self-assembling polymer forms a cage-like structure around iron-containing metal oxide nanoparticles. This innovative approach allows for the creation of stable emulsions at significantly lower concentrations, simplifying the process and reducing costs. These nanoparticles remain stable and uniformly distributed even under high-salt conditions, making them highly effective for drug delivery, in situ or in vivo imaging, and enhanced oil recovery and catalysis. The technology's competitive advantages include monodispersity, controllability, and shape stability, offering significant improvements over existing methods.

## Competitive Advantages

- No surfactants required
- Stability in high-salt conditions
- Simpler synthesis process
- Emulsion stability

## Areas of Application

- Drug delivery
- In situ or in vivo imaging / magnetic imaging
- Enhanced oil recovery / industrial catalysis
- Template for hydrogels and aerogels with novel structures and properties, e.g. anti-icing

## Publication and Resources

- Patent publication: [US20240093005A1](#)
- Researcher Profile: [Dr. Steven Bryant](#)
- Lab website: [Department of Chemical & Petroleum Engineering](#)

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