

# Biphasic Biosurfactant-Biocatalyst Conjugated Magnetic Nanometal Oxide Composition for Degradation of Hydrocarbons and Vegetable Oils Dispersed in Wastes

CATEGORY OF INVENTION:	TECHNOLOGY READINESS LEVEL (TRL)	INTELLECTUAL PROPERTY
Environmental Nanotechnology Bioremediation Wastewater Treatment Industrial Waste Management Green Chemistry	TRL: 4	508905

## ABOUT THE TECHNOLOGY

**Biphasic biosurfactant-biocatalyst conjugated magnetic nanometal oxide composition** for the efficient degradation of recalcitrant hydrocarbons and vegetable oils in both solid and liquid waste streams.

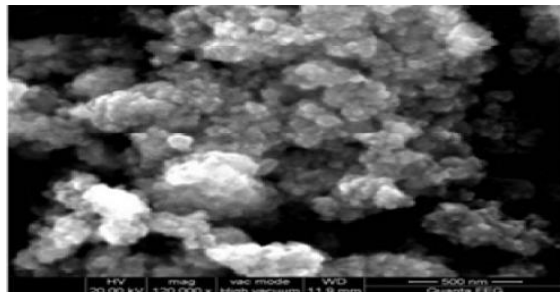
## PROBLEM ADDRESSED

Oil refineries and food industries generate oily sludge and high-lipid wastewater that are difficult to degrade using conventional methods.

1. Presence of recalcitrant hydrocarbons and fats hinders biological treatment efficiency.
2. Traditional techniques like incineration, pyrolysis, and combustion are energy-intensive and cause secondary pollution (air emissions, toxic residues).
3. Conventional bioremediation is too slow, often requiring over a month to treat complex oily wastes.
4. Untreated or partially treated oily wastes pollute soil, air, and groundwater, posing environmental and public health risks.
5. Existing solutions lack reusability, selectivity, and adaptability to various oily waste compositions.

## ADVANTAGE

1. Rapid Treatment: Achieves up to 87% hydrocarbon removal within 48 hours.
2. Reusable Material: Nanoparticles can be reused up to 50 cycles, lowering operational costs.
3. Easy Separation: Magnetic properties allow simple recovery using an external magnetic field.
4. Eco-friendly Process: Avoids foul odor, sludge generation, or secondary pollution.
5. Efficient Biodegradation: Converts toxic hydrocarbons into fatty acids and alcohols.
6. Compact Footprint: Requires less space for deployment compared to traditional bioreactors.



## USP

1. Dual-action: biosurfactant + biocatalyst
2. Magnetic recovery and reuse (up to 50 cycles)
3. Fast degradation (within 48 hours)
4. Works on both solid and liquid oily waste
5. Eco-friendly and sludge-free
6. Compact system with low footprint
7. Converts pollutants to harmless end-products

## MARKET FORECAST



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