



# Engineered bacteria for the synthesis of a biodegradable polymer coating

**Genetically modified bacteria for the synthesis of a biodegradable polymer to coat fertilizer pellets, allowing nitrogen to be slowly released over time.**

**IP Status:** US Patent Pending; **Application #:** 18/506,263

## Applications

- Slow-release nitrogen fertilizers
- Flocculant agent for wastewater treatment

## Key Benefits & Differentiators

- **Fully-biodegradable:** the polymer material gamma polyglutamate is produced by bacteria
- **Potential to scale-up :** the bacterial strain can be grown on simple sugars or other natural carbon compounds
- **Flocculant :** the polymer coating is water soluble and negatively charged

## Technology Overview

Using nitrogen fertilizers often results in premature nitrogen loss through groundwater leaching, rain events, or over application. Many companies produce small pellets that entrap fertilizers within a water soluble polymer matrix that slowly dissolves and releases the fertilizer over time, providing long-term application. However, these conventional polymers used in slow-release fertilizer formulations are often not fully biodegradable. Companies are highly interested in replacing conventional polymers with a biodegradable alternative.

Researchers at the University of Minnesota have developed an engineered bacteria to produce a biodegradable polymer coating for fertilizer pellets, allowing nitrogen to be released slowly over time. The polymer material is primarily made of gamma polyglutamate produced by *Azotobacter vinelandii* through a process that potentially can be scaled-up. Nitrogen is released to the soil from the fertilizer entrapped in the polymer-coated pellet and from the glutamate molecules that are the primary building block of the polymer coating. Thus, resulting in a completely biodegradable product. Lastly, this polymer is water soluble and negatively charged, which allows it to act as a flocculant agent in wastewater treatment. This new technology has great potential to significantly impact agricultural and wastewater treatment industries by providing a sustainable and biodegradable alternative to conventional polymers.

## Phase of Development

**TRL: 3-4**

Proof of concept, polymer has been produced in a lab-scale.

## Desired Partnerships

This technology is now available for:

## Technology ID

2023-061

## Category

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Engineering & Physical Sciences/Sustainable Technology  
Life Sciences/Biomaterials  
Life Sciences/Industrial Biotech  
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### **Researchers**

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