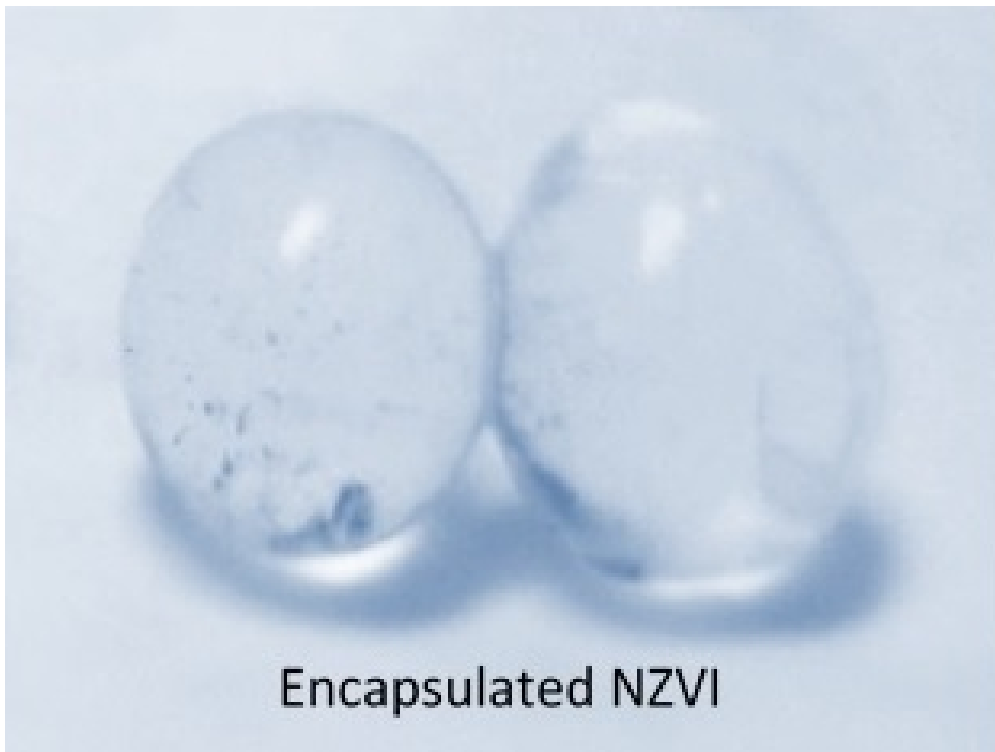


## Removal and Recovery of Phosphate, Selenium, and Arsenic from Water, w/ Potential Reuse as Fertilizers (RFT-430, RFT-431)

### Invention Summary

Scientists at NDSU have developed a technology that removes selenium, arsenic, trichloroethylene and phosphorus from water using beads containing reactive nano zero valent iron (nZVI) particles encapsulated in calcium alginate beads. When charged with phosphorus or selenium, these beads can be beneficially reused to provide phosphate and/or micronutrient fertilization. Therefore, the technology provides dual benefits of cleaning eutrophic and contaminated water bodies and waste streams, while collecting some of the contaminants (selenium and phosphate) with the potential of reuse in a form that facilitates this reuse.



### Benefits

- Encapsulation of reactive nZVI particles ensures better contact with contaminants and higher efficiency of reaction and retention of the contaminants.
- Calcium alginate beads enable opportunities for co-encapsulation of microbes, enzymes, and/or other active ingredients

- Studies involving phosphorous have shown phosphate recovery of 80% or higher were achieved within 30 minutes of treatment
- Formulations suitable for standing, slow-moving, or rapidly moving water
- Beads can be placed in porous containers and suspended from the surface so they stay in the zone of highest phosphorus concentration
- Readily manufactured at commercial scale using standard processes;
- May be applied across a range of locations and applications

## Applications

- Treatment of eutrophic water bodies
- Industry effluent, acid mine drainage, contaminated groundwater, wastewater treatment and treatment of feedlot ponds and runoff;

## Technology

Manufacturing a batch of beads takes about 6.5 hours, 30 minutes to form beads and 6 hours for bead hardening. The beads can then be dried in an oven or in open air. The manufacturing process can be fully automated and needs a pump and small diameter tubing that can deliver the liquid alginate drop wise to the bead forming solution. The dry beads are very light in weight and can be packaged in airtight bags or pouches.

## Patents

This technology is patent pending with fully preserved worldwide PCT patent rights and is available for licensing/partnering opportunities.

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