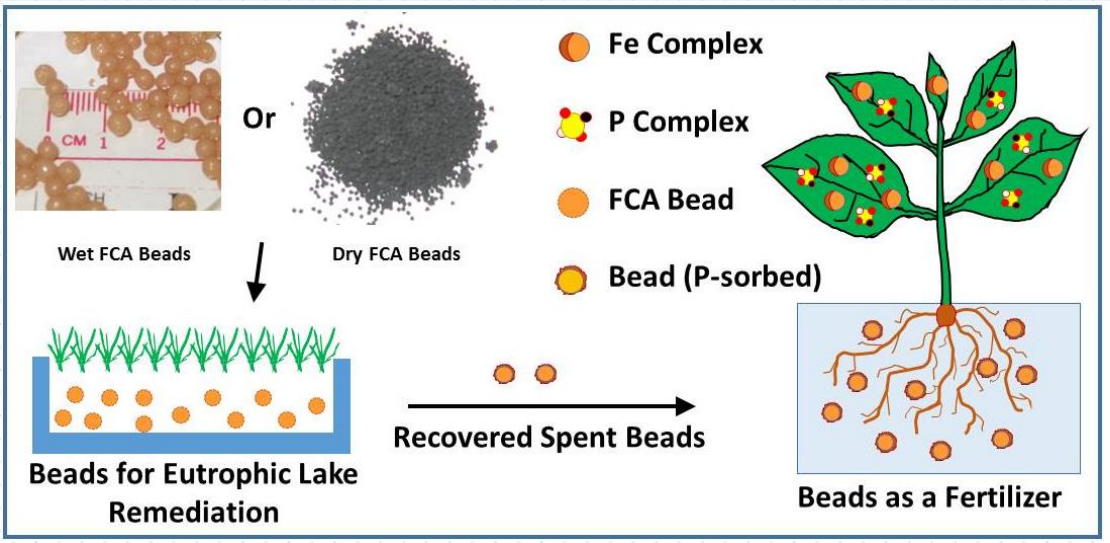
Non-Confidential Description

Removal and Recovery of Phosphate from Water Bodies and Reuse as a Fertilizer

Technology Case: RFT-419



Invention Summary

Scientists at NDSU have developed biodegradable iron-containing alginate beads that remove phosphorus from water, and can then be beneficially reused to provide Phosphate fertilization. As a result, this dual-use technology can be used to clean water bodies that are eutrophic due to excess phosphorous, then use the phosphorous for fertilization in agricultural, nursery, and greenhouse settings where phosphorus is a limiting nutrient.

Benefits

- Phosphorus removal is effective at concentrations as low as 10-100 µg/L (30 µg/L is considered eutrophic)
- 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
- Works well from pH 4 to pH 9, so may be applied across a range of locations and applications
- Formulations suitable for standing, slow-moving, or rapidly moving water
- Environmentally-friendly materials – alginate biopolymer, iron, and phosphorus are all suitable for placement in water (in the case of the pristine beads) and application to land (after absorbing phosphorus)

Applications

- Treatment of eutrophic water bodies
- Industry effluent, 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.

Lead Inventor

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Dr. Bezbaruah received a B.S. in Civil Engineering, MS in Environmental Science and Engineering, and then completed his doctoral studies in Civil (Environmental) Engineering at the University of Nebraska-Lincoln. Dr. Bezbaruah's group specializes in environmental nanotechnology with emphasis on life-cycle studies. His Nanoenvirology Research Group has worked on surface modification of nanoparticles and their application for environmental remediation and resource recovery. Another emphasis of the group is studying the effects of nanomaterials on ecosystem components. On-going projects in Dr. Bezbaruah's group include the use of common starches and plant-based polymers for surface modification of nanomaterials for environmental, biomedical, and food science applications.

Inquiries

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