SPIRAL WOUND INTERFACIAL REACTORS FOR SEPARATION AND RESOURCE RECOVERY

Tech ID: 34277 / UC Case 2026-032-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

The widespread occurrence of nutrient-rich and metal-contaminated wastewater presents an environmental challenge and untapped economic opportunity. Ammonia, copper, and phosphorous are prime targets. For example, ammonia is industrially produced by the Haber-Bosch process, a highly energy-intensive (~12.5 kWh/kg-N to convert N_2 to ammonia, consuming 1-2% of global energy usage) and greenhouse gas-emitting (~1.2% of global CO_2 emissions) technique. After use, primarily as fertilizer, nearly 50% of all U.S.-consumed ammonia ends up in municipal wastewater and animal feedlot retention systems. Technologies presently proposed for recovering critical nutrients and metals from wastewater are limited in scalability by high energy demands, costly chemicals or membrane requirements, low efficiencies, or fouling challenges.

UC Berkeley researchers have developed and demonstrated a low-cost, robust, and near-zero-energy reactor that simultaneously recovers ammonia and other valuable ions (e.g., P and Cu) from wastewater streams. The reactor is driven by sunlight or low-grade waste heat, such that it eliminates the need for external pumping—further cutting energy consumption and capital cost. The functional material is an inexpensive cloth that is also roll-to-roll compatible, making it economically scalable and easy to manufacture. The reactor can be implemented within wastewater streams including municipal wastewater, animal feedlot wastewater, and organic waste digestate. It may further be adapted to recover other valuable resources, such as lithium, from sources like mining wastewater and landfill leachate. It may even be extended beyond nutrient and metal recovery to separation or pre-concentration of volatile organic compounds such as ethanol and methanol from aqueous solutions.

SUGGESTED USES

» Recovery of ammonia from wastewater streams for fertilizer production, as well as phosphorous, copper, or other nutrient and metal recovery

ADVANTAGES

» Simple, low-cost design

» Operational flexibility

» High recovery efficiency

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

» **Agriculture & Animal Science**
» Other
» **Energy**
» Other
» **Environment**
» Other
» Remediation
» **Engineering**
» Engineering
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» **Materials & Chemicals**
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RELATED CASES

2026-032-0

▶ Multifunctional Water Filters For Metal And Oxyanion Removal

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