



## ELECTROCHEMICAL PHOSPHATE REMOVAL AND RECOVERY CELLS

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Inventors: Kyoung-Shin Choi, Dohwan Nam, Ryan Belson

### The Invention

UW-Madison researchers have developed an electrochemical system that can not only selectively remove phosphate from a phosphate containing solution but also recover it as  $H_3PO_4$  without needing additional acid or creating byproduct wastes. This system may offer a multitude of new opportunities to utilize phosphate wastes that are not currently recycled to create a sustainable phosphate cycle. The system is based on the discovery of an extraordinary ability of Bi to store and release phosphate through a reversible electrochemical solid-state conversion reaction between Bi and  $BiPO_4$ . The phosphate removal/recovery system is composed of a phosphate-removal cell and a phosphate-recovery cell. In the phosphate-removal cell, a Bi electrode serves as the anode and is oxidized to  $BiPO_4$ , storing phosphate. When the conversion of Bi to  $BiPO_4$  is completed, the resulting  $BiPO_4$  electrode will serve as the cathode in the phosphate recovery cell, where it is reduced back to Bi, releasing phosphate to the solution, and producing  $H_3PO_4$ .

### Key Benefits

- Performs well in high phosphate concentrations such as steel making
- Recovers high purity phosphoric acid or phosphate solutions (no need for additional acid)

### Additional Information

#### For More Information About the Inventors

- [Kyoung-Shin Choi](#)

#### Tech Fields

- [Clean Technology: Monitoring, remediation & waste reduction](#)

For current licensing status, please contact Jennifer Gottwald at [jennifer@warf.org](mailto:jennifer@warf.org) or 608-960-9854