Clean Technology

SELECTIVE ELECTROCHEMICAL EXTRACTION AND RECOVERY OF MULTIVALENT IONS

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Inventors: Kyoung-Shin Choi, Princess Merenini, Dohwan Nam, Brian Foster

The Invention

UW-Madison researchers have developed a method of using an ion-storage electrode to electrochemically extract Ca^{2+} and Mg^{2+} from feed water and recover them in a separate cell as useful chemicals. They have shown that 5,7,12,14-pentacenetetrone (PT) can preferentially extract Ca^{2+} and Mg^{2+} over Na^{+} while maintaining a stable capacity over a wide pH range (pH 3-12). Due to PT's stability in basic media, it is possible to recover the extracted Ca^{2+} as $CaCO_3$ in basic media where Na^{+} is highly soluble. As a result, although PT's divalent ion selectivity is modest, the co-extracted and co-released Na^{+} did not interfere with the separation and collection of $CaCO_3$. They have also developed polyimide electrodes that show even higher selectivities for Ca^{2+} and Mg^{2+} removal/recovery than the PT electrodes. Furthermore, both PT and polyimide electrodes may selectively extract trivalent ions like rare earth ions (i.e., lanthanide ions) with the preference of trivalent ions > divalent ions > monovalent ions. This ability may be used to separately extract and recover divalent and trivalent ions generated from various mining, industrial, and water-treatment processes.

Additional Information

For More Information About the Inventors

- Kyoung-Shin Choi

Tech Fields

- Clean Technology : Solar, wind & water technologies

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854