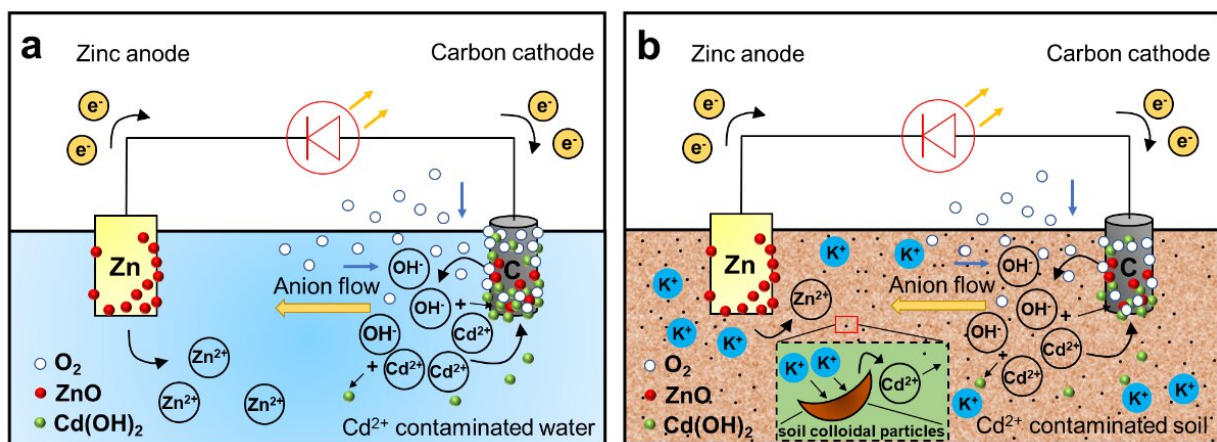


A primary battery system for efficient remediation of cadmium pollution and electricity generation

April 12 2023, by Zhao Weiwei and Chen Chaowen



Mechanism of primary battery based on Cd²⁺-contaminated (a) water and (b) soil. Credit: Chen Chaowen

A team lead by Prof. Wu Zhengyan and Prof. Zhang Jia from the Institute of Intelligence, Hefei institutes of physical science of Chinese Academy of Sciences, in collaboration with Prof. Cai Dongqing from Donghua University, constructed a new primary battery system that can effectively remove Cd²⁺ from the environment and generate electricity at the same time.

In paper published in *Fundamental Research* recently, the team described

how they applied zinc as the anode, graphite as the cathode, and Cd^{2+} -contaminated media (Cd^{2+} -[contaminated water](#) or soil) as the electrolyte to develop this system.

Cd^{2+} , with high solubility and migration rate, causes severe problems in ecosystems and [human health](#). Although the traditional technologies can remediate Cd^{2+} -contaminated water and soil, their practical application may be largely constrained by the high energy consumption and operation complexity. Therefore, there is an urgent need to develop new remediation technologies on Cd^{2+} -contaminated media.

The battery system achieved efficient solidification and removal of Cd^{2+} in water and soil through the reduction of dissolved oxygen by internal Galvanic reactions in the battery. A large amount of OH was generated and precipitated with Cd^{2+} driven by an [electric field](#).

They designed an output power supply through connection of multiple primary [battery](#) systems in series. In the process of Cd^{2+} removal, LEDs were continuously lit.

"The idea is to kill two birds with one stone," said Chen Chaowen, the first author of the paper.

They also checked plants, zebrafish, and [soil](#) microorganisms after applying this system and found they were all healthy.

The technology shows characteristics of low cost, green energy conservation, and simple operation, possessing broad application prospects.

More information: Chaowen Chen et al, A primary battery for efficient cadmium contamination remediation and electricity generation, *Fundamental Research* (2023). [DOI: 10.1016/j.fmre.2023.03.001](https://doi.org/10.1016/j.fmre.2023.03.001)

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