

## Zinc-Ion Battery Using Reject Water Electrolyte

Technology Domain: Chemistry

Patent Application Number: 202541036355

Status (Patent/TRL): Patent Pending / TRL 3

### Technology Summary:

This invention presents a groundbreaking approach to energy storage: Sustainable Aqueous Zinc-Ion Batteries (AZIBs) that utilize reject water from water purification systems as a primary electrolyte. The key technical solution involves repurposing this waste stream, rich in salts and minerals, into a functional, low-cost battery component. A key inventive feature is the electrochemical preparation method for a stable zinc-intercalated nickel hexacyanoferrate (NiHCF) cathode, where the reject water itself is employed during the deposition and cycling processes.

Results demonstrate remarkable performance, including stable operation at an unprecedented 2.5V (significantly higher than typical AZIBs), high capacitance retention (88% after 5,000 cycles), and efficient waste management. Its primary use is to provide a highly sustainable, cost-effective, and environmentally friendly energy storage solution for renewable energy systems, grid storage, and portable devices, transforming waste into a valuable resource.

