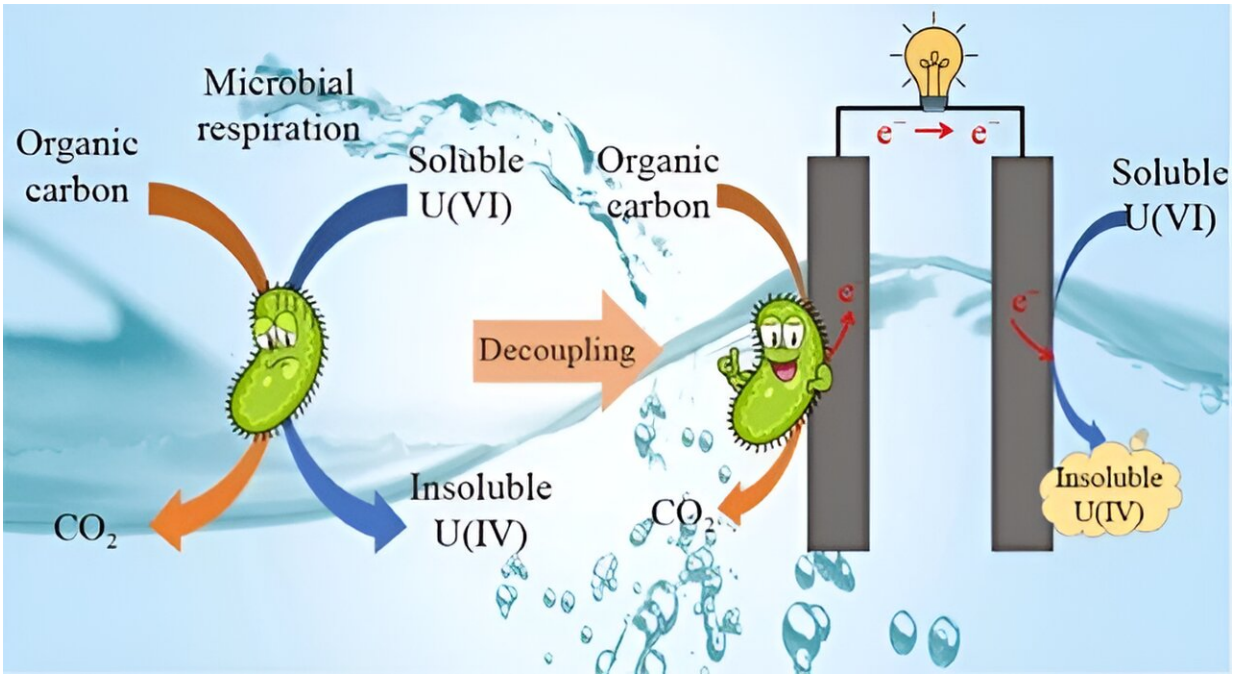
Novel method for uranium extraction from wastewater also generates electricity

December 15 2023

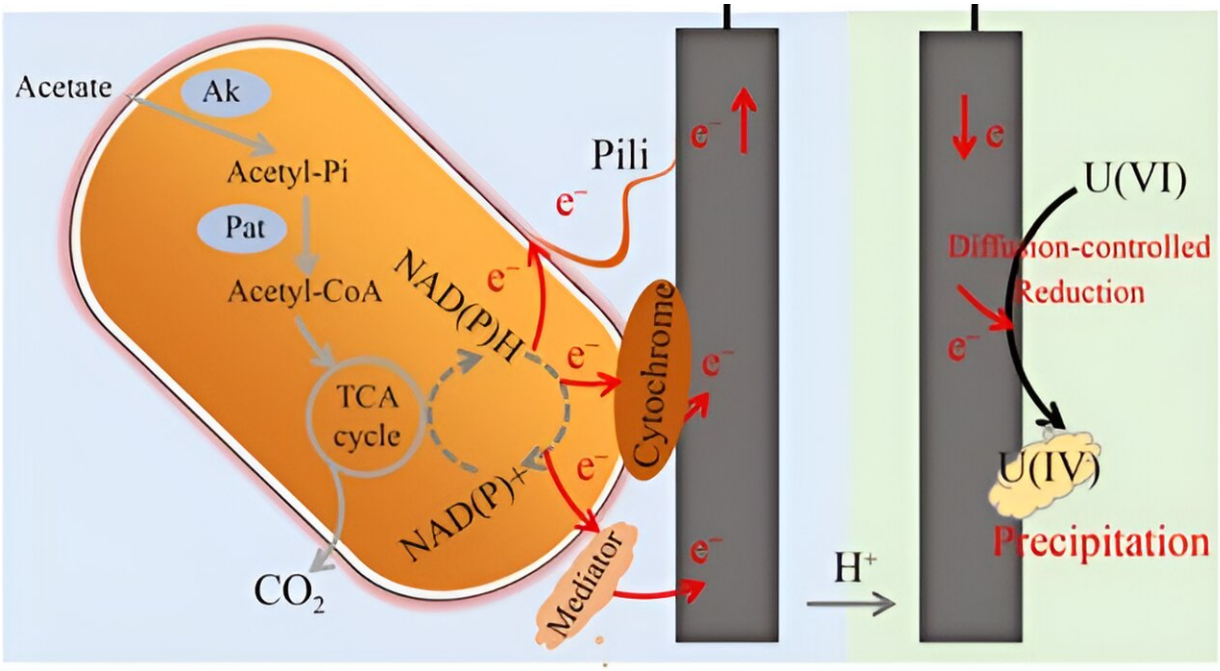


Credit: *Frontiers of Environmental Science & Engineering* (2023). DOI: 10.1007/s11783-024-1764-y

In a new study published in the journal *Frontiers of Environmental Science & Engineering*, researchers from Northwestern Polytechnical University introduced a revolutionary SMEC method for uranium recovery from wastewater. This innovative technique not only efficiently extracts uranium but also generates electrical energy, offering a more

sustainable and less complex alternative to traditional extraction methods that are often hindered by biotoxicity.

Researchers developed a spontaneous microbial electrochemical (SMEC) method that spatially decouples microbial oxidation and uranium reduction reactions. This innovative system consists of two chambers separated by a proton exchange membrane, with an anode made of carbon felt and a cathode of titanium foil. The process involves microbial-driven electrochemical reactions, which facilitate uranium extraction from wastewater while simultaneously generating electrical energy.



Conceptual model for microbial-driven ectopic uranium extraction with net electrical energy production. Credit: *Frontiers of Environmental Science & Engineering* (2023). DOI: 10.1007/s11783-024-1764-y

The study has demonstrated stable and efficient uranium extraction with net electrical energy production. The SMEC method proved effective with both synthetic and real wastewater, achieving high uranium extraction efficiency. Moreover, metagenomic sequencing revealed the formation of efficient electroactive communities on the anodic biofilm, enriching key functional genes and metabolic pathways involved in electron transfer and energy metabolism.

This research marks a significant step forward in the field of sustainable and cost-effective uranium extraction technologies. It opens the door to innovative strategies in resource recovery and wastewater management, offering potential solutions for industries dealing with heavy metal contamination and energy production challenges.

More information: Xin Tang et al, Microbial-driven ectopic uranium extraction with net electrical energy production, *Frontiers of Environmental Science & Engineering* (2023). DOI: 10.1007/s11783-024-1764-y