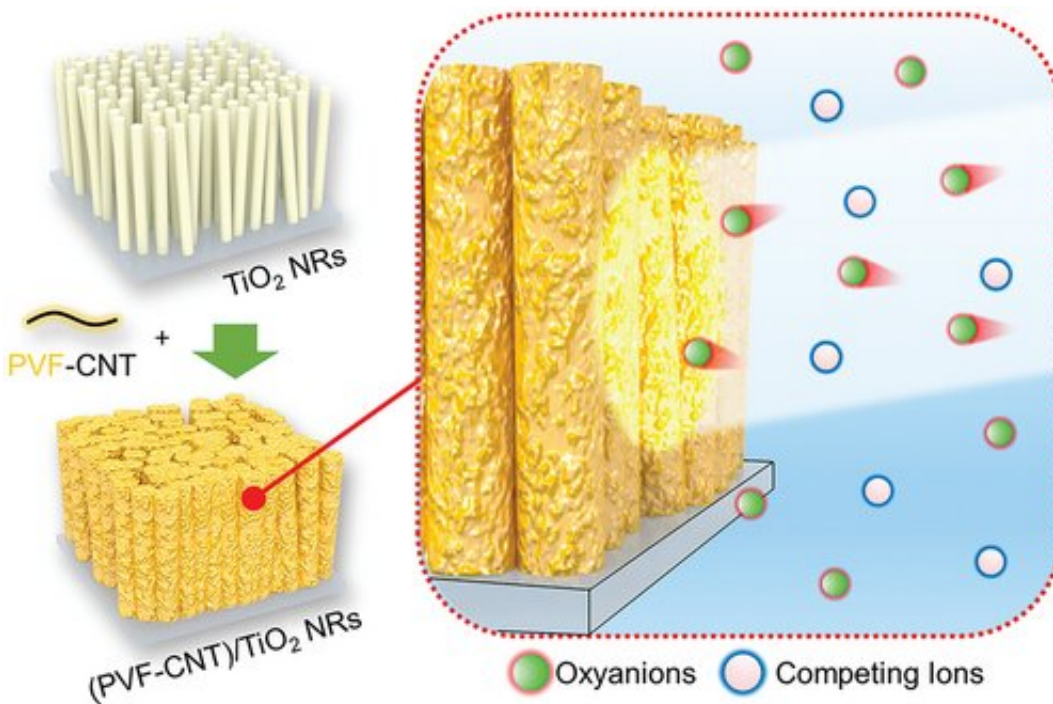


Renewable solar energy can help purify water, research shows

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Schematic diagram of (left) the formation of (PVF-CNT)/TiO₂ NR electrodes. PVF-functionalized CNT was deposited on the NR arrays by electrodeposition. (Right) The proposed solar-driven PEC separation of heavy metal oxyanions is displayed. Credit: *Small* (2023). DOI: 10.1002/sml.202305275

Using electrochemistry to separate different particles within a solution (also known as electrochemical separation) is an energy-efficient strategy for environmental and water remediation: the process of [purifying contaminated water](#). But while electrochemistry uses less

energy than other, similar methods, the electric energy is largely derived from nonrenewable sources like fossil fuels.

Chemists at the University of Illinois Urbana-Champaign have demonstrated that water remediation can be powered in part—and perhaps even exclusively—by renewable energy sources. Through a semiconductor, their method integrates [solar energy](#) into an electrochemical separation process powered by a redox reaction, which manipulates ions' electric charge to separate them from a solution like water. This work appears in the journal *Small*.

Using this system, the researchers successfully separated and removed dilute arsenate—a derivative of arsenic, which is a major waste component from steel and mining industries—from wastewater.

This work represents proof-of-concept for the applicability of such systems for wastewater treatment and environmental protection.

"Global electrical energy is still predominantly derived from nonrenewable, fossil-fuel-based sources, which raises questions about the long-term sustainability of electrochemical processes, including separations. Integrating [solar power](#) advances the sustainability of electrochemical separations in general, and its applications to water purification benefit the water sector as well," said lead investigator Xiao Su, a researcher at the Beckman Institute for Advanced Science and Technology and an assistant professor of chemical and biomolecular engineering.

More information: Ki-Hyun Cho et al, Redox-Functionalized Semiconductor Interfaces for Photoelectrochemical Separations, *Small* (2023). [DOI: 10.1002/sml.202305275](https://doi.org/10.1002/sml.202305275)

Provided by Beckman Institute for Advanced Science and Technology

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