New nanocomposite improves solar evaporation for water purification
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The precise atomic and composition control in the building block of HoMS realizes an indirect bandgap structure with abundant energy states around the Fermi level, which enhances nonradiative relaxation to facilitate photothermal conversion," said Prof. Wang Dan, the corresponding author of the study, "The unique hollow multishelled structure can efficiently enhance light absorption like a blackbody."

HoMS decreases the energy required for water evaporation. Simulation results show that HoMS establishes a thermal field gradient, thus providing the driving force for vapor evaporation.

"HoMS also benefits water transport," said Wang, "The confined cavities in HoMS promote liquid water diffusion owing to the capillary pumping effect, and the nanopores in HoMS induce water molecules to evaporate in the form of clusters, thus enabling evaporation with less enthalpy."

With highly efficient photoabsorption and photothermal conversion, a super-fast evaporation speed of 4.02 kg m⁻²h⁻¹ has been achieved. The evaporation speed barely changed after 30 days, and with no salt accumulation, indicating a long-term stability.

Notably, the concentration of pseudovirus SC2-P could be decreased by six orders of magnitude after evaporation.

This amorphous Ta₂O₅/C composite is readily fabricated, carried, stored, and recycled. It can be applied to the purification of seawater, or to heavy metal- or bacteria-containing water, obtaining drinkable water that meets the standard of the
The scientists from IPE are preparing a prototype of seawater desalination for the residents on isolated islands.


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