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KUWAIT INSTITUTE FOR SCIENTIFIC RESEARCH

Innovation Brief

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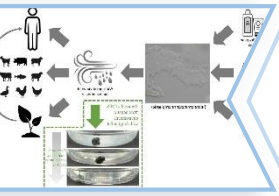


A Novel Approach for Removing Microplastics from Water

A new study led by Texas A&M AgriLife Research has identified what may be a novel biological approach for removing extremely small and potentially dangerous plastic particles from aquatic environments via fungal palletization as a form of natural bioremediation.

Artificial Intelligence Tools Shed Light on Millions of Proteins

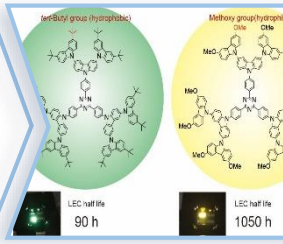
A research team at the University of Basel and the SIB Swiss Institute of Bioinformatics uncovered a treasure trove of uncharacterised proteins. Embracing the recent deep learning revolution, they discovered hundreds of new protein families and even a novel predicted protein fold. The study has now been published in *Nature*.

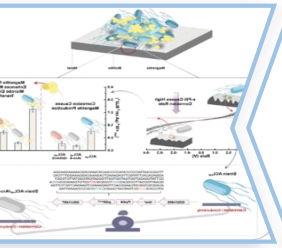
Floating Sea Farms: A Solution to Feed the World and Ensure Freshwater by 2050

In what is believed to be a world first, University of South Australia researchers have designed a self-sustaining solar-driven system that evaporates seawater and recycles it into freshwater, growing crops without any human involvement. The experiment is published in the *Chemical Engineering Journal*. It could help address looming global shortages of freshwater and food.

New Eco-friendly, Long-lasting Light-emitting Electrochemical Cell

In research that could lead to a new age in illumination, researchers from Japan and Germany have developed an eco-friendly light-emitting electrochemical cells using new molecules called dendrimers combined with biomass derived electrolytes and graphene-based electrodes. Their findings were published in the journal *Advanced Functional Materials*.

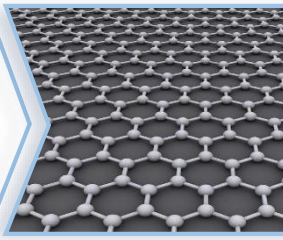




Anaerobic Microbial Iron Corrosion due to Conductive Pili

Researchers from Northeastern University in Shenyang, China report that the sediment-dwelling bacterium *Geobacter sulfurreducens* uses electrically conductive protein threads to decompose iron anaerobically in a process called electrobiocorrosion. They produce magnetite from the iron, which promotes further corrosion in a positive feedback loop.

Scientists Design Novel Nonlinear Circuit to Harvest Clean Power Using Graphene



Obtaining useful work from random fluctuations in a system at thermal equilibrium has long been considered impossible. Now, a new study published in *Physical Review E* has proven that thermal fluctuations of freestanding graphene, when connected to a circuit with diodes having nonlinear resistance and storage capacitors, does produce useful work by charging the storage capacitors.