

Innovation Brief

April - June 2023

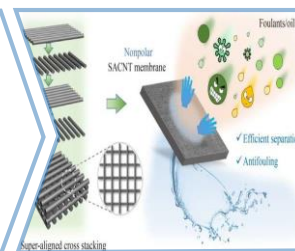
[A Novel, Completely Solid, Rechargeable Air Battery](#)

Researchers from Waseda University developed a solid-state battery that uses solid electrodes and solid electrolytes, unlike the more commonly known lithium-ion batteries, which use liquid electrolytes. These batteries overcome various challenges associated with liquid-based batteries, such as flammability, limited voltage, unstable reactants, and poor long-term cyclability and strength.



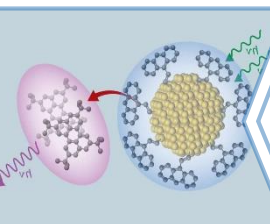
[Innovative Strategy for Efficient Wastewater Treatment: Cross-Stacked Super-Aligned Carbon Nanotube Membranes](#)

Researchers from Beijing Forestry University & Tsinghua University proposed a novel nonpolar SACNT membrane by using a layer-by-layer cross-stacking method using the nonpolar carbon nanotubes as the raw material. The SACNT membrane surface chemistry is simple and inert, potentially eliminating covalent bonding induced membrane fouling, and improving the efficiency of municipal sewage treatment and waste water recovery.



[New Material Transforms Light, Creating Possibilities for Multiple Applications](#)

A group of scientists and engineers from the University of Texas have created a new class of materials that can absorb low energy light and transform it into higher energy light. Composed of ultra-small silicon nanoparticles and organic molecules, this new composite moves electrons between its organic and inorganic components, with applications for more efficient solar panels, more accurate medical imaging and better night vision goggles.



[New Atomic-Scale Understanding of Catalysis Could Affect Petroleum Refinery](#)

University of Wisconsin–Madison chemical engineers have developed model of how catalytic reactions work at the atomic scale. This understanding could allow engineers and chemists to develop more efficient catalysts and tune industrial processes—with potentially enormous energy savings.



[Breakthrough Discovery Could Help Pollinators Resist Disease Infections](#)

Researchers at the University of Massachusetts Amherst discovered that bumblebees that ate whole sunflower pollen and the spiny sunflower pollen shells had 87% lower infections from a widespread gut pathogen, *Crithidia bombi*. Also, bees fed pollen from other flowers in the sunflower family had similarly low rates of *C. bombi* infections.



[Novel Method of Stretching Metals to Create High-Quality Metal Oxide Thin Films](#)

Researchers from the University of Minnesota Twin Cities developed a method to achieve atomically-precise synthesis of quantum materials, with potential for controlling oxidation-reduction in catalysis, and chemical reactions occurring in batteries or fuel cells. Applications include quantum computing, microelectronics, sensors and energy catalysis.



[Groundbreaking Images of Root Chemicals Offer New Insights on Plant Growth](#)

Technology used in cancer research leads to a roadmap of chemicals important for agriculture, food production and climate resilience. Researchers at University of California have developed a new understanding of chemicals that are responsible for plant by applying imaging technology to plant roots. The chemical 'roadmap' identifies where key molecules are distributed along corn roots and how their placement factors into the plant's maturation.

