搜狐

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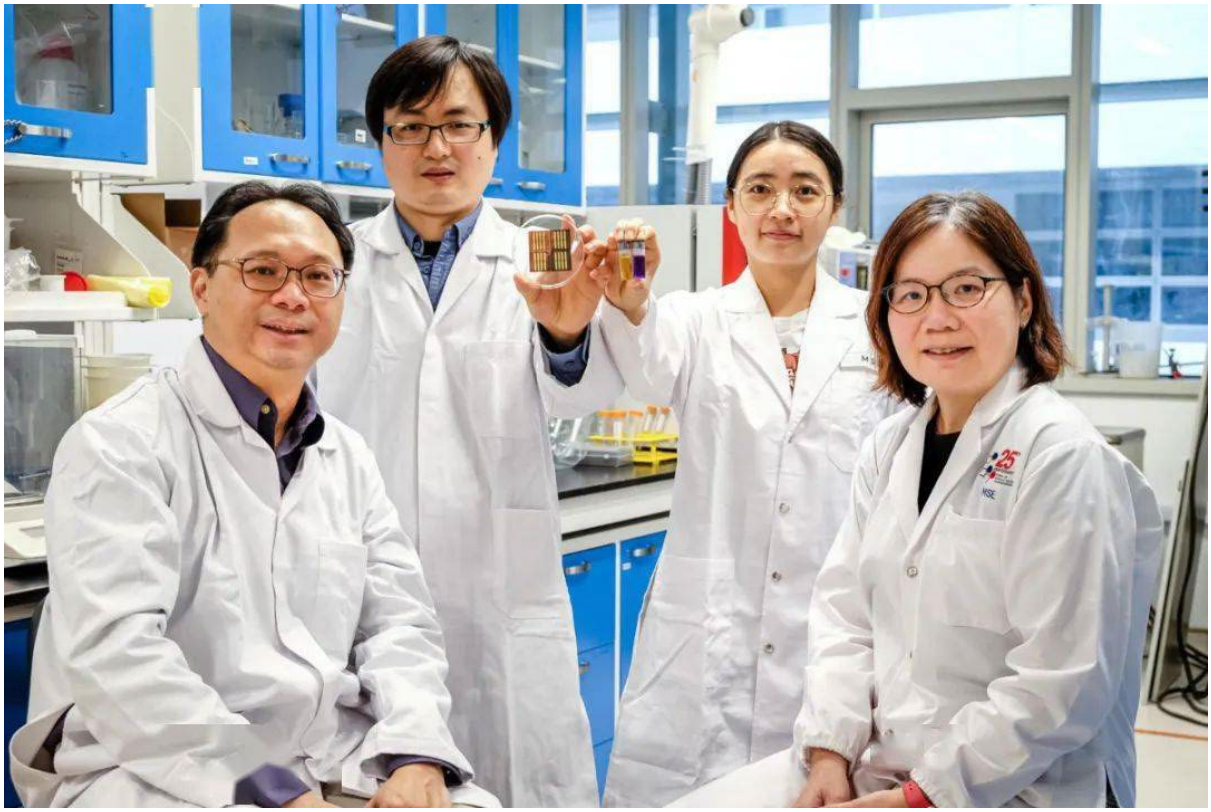
English translation

New manufacturing method for perovskite batteries: avoid the use of toxic lead!

Researchers in Singapore have discovered a less environmentally damaging way to produce perovskite solar cells in the lab that does not require the lead previously used.

Scientists at Nanyang Technological University, Singapore (NTU Singapore) have replaced the traditional capping layer of perovskite solar cells, which leads to the production of toxic lead, with a zinc-based capping layer.

The result of the experiment was a one-inch-square perovskite cell covered with a zinc compound. Inspections showed that the cells were effectively sealed and the perovskite was unaffected by the compound layer. The researchers, led by Professors Sum Tze Chien and Lam Yeng Ming, say this represents a step towards the industrial production of greener and more viable perovskite solar cells.



One of the biggest disadvantages of using perovskite solar cells is their environmental impact. Dr Ye Senyun, a researcher at Nanyang Technological University's School of Physical and Mathematical Sciences, said, "By using zinc and other non-toxic metals for the capping layer, our innovative approach has the potential to address a major hurdle in the large-scale deployment of perovskite solar cells. "

The researchers also say this innovative process for zinc opens the door to the development of other materials and compounds that could improve the performance of perovskite cells.

Despite record efficiency levels and performance, perovskite cells have yet to be mass-produced due to unsustainable levels of degradation from exposure to oxygen, moisture, and light. This decay also has researchers concerned that lead could escape, albeit in small quantities, from damaged batteries and contaminate the surrounding environment.

Laboratories around the world have conducted perovskite tests and published corresponding efficiency results. Previously, researchers at the Australian National University announced a silicon-perovskite tandem cell efficiency of 30.3%, while the world record for perovskite efficiency is currently held by Helmhotz-Zentrum Berlin. The research institute claims an efficiency of 32.5 percent for a 1 cm square cell.

Half Precursor vs. Full Precursor

The "traditional" way of producing perovskite cell cap layers uses the semi-precursor (HP) method. One precursor chemical is placed on the perovskite layer, forming part of the protective cap, while another is formed through a reaction between the first precursor and the perovskite, drawing lead ions from within the perovskite layer. Inhale upwards to form a lead-based capping layer.

Scientists at Nanyang Technological University have devised an all-precursor (FP) approach that uses directly interacting chemicals to create the capping layer, which is then used in the perovskite layer. The zinc-based compound is made from zinc halide salts and PEAI, dissolved in a solvent called acetonitrile, and then coated on a rapidly spinning layer of perovskite. Afterwards, the layers are sealed with heat, bonding the perovskite and capping layers together.

This approach avoids the use of toxic lead since it does not need to be chemically extracted from the perovskite.

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