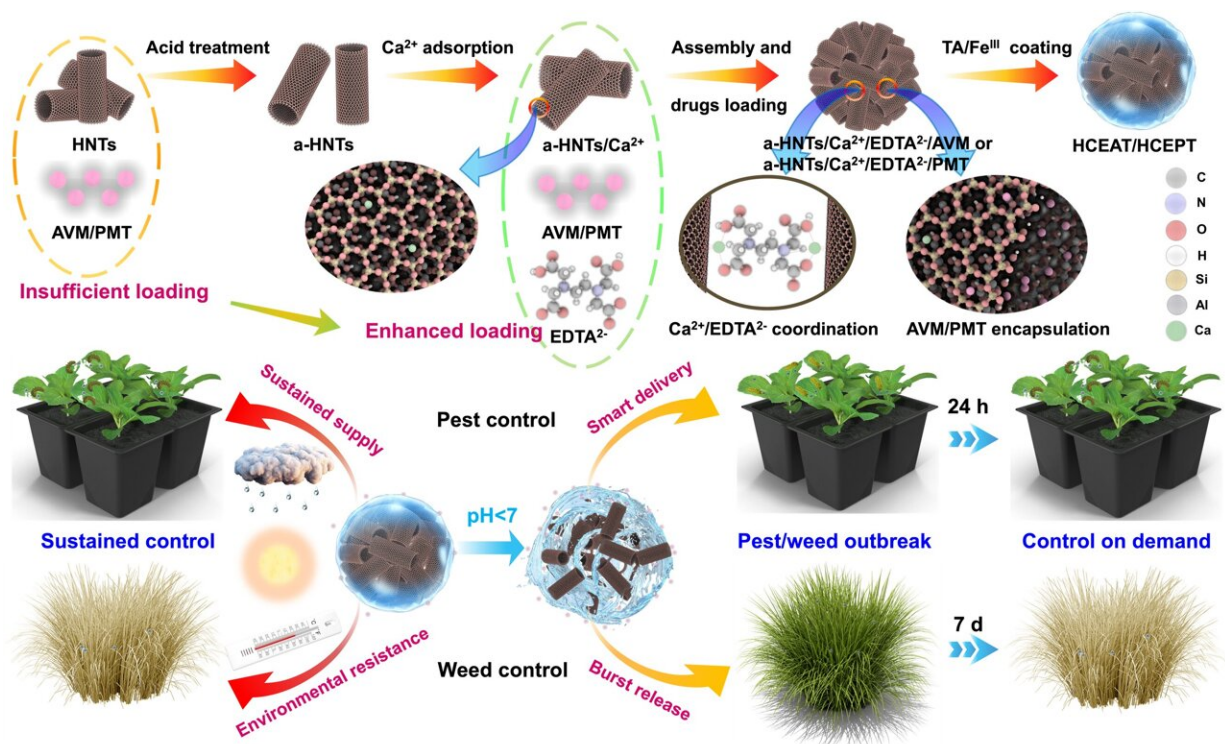


Researchers fabricate eco-friendly pesticide delivery system

June 19 2024, by Zhang Nannan



Schematic illustration of fabrication and mechanism of smart pesticides. Credit: Teng Guopeng

A research team led by Prof. Wu Zhengyan and Zhang Jia from the Hefei Institutes of Physical Science of the Chinese Academy of Sciences has developed a new environmentally friendly way to deliver pesticides using porous microspheres made of halloysite nanotubes (HNTs).

These microspheres are formed by reversible metal-ligand coordination interactions, making them responsive to changes in pH, humidity, and enzymes. The results were [published](#) in the journal *Small*.

Traditional pesticide formulations are limited by their rapid release, resulting in low efficacy and serious environmental risks. To address this, researchers are developing greener pesticides with controlled-release properties. Improving the release of existing active ingredients is a simpler and more effective way to improve efficacy and reduce ecological risks, thereby reducing misuse.

In this study, the researchers loaded the insecticide avermectin (AVM) and the herbicide prometryn (PMT) into the HNT microspheres. They then coated the microspheres with a [tannic acid](#)/iron complex, fabricating two controlled-release pesticides called HCEAT and HCEPT. These new formulations have high pesticide loading capacities and effectively release the pesticides in response to weak acids.

In addition, these pesticides show improved ultraviolet light resistance, better foliar adhesion, and reduced leaching to soil, with no observed adverse effects on plants and soil organisms.

"This approach could lead to more efficient and environmentally friendly pesticide use in agriculture, supporting sustainable farming practices," said Teng Guopeng, first author of the study.

More information: Guopeng Teng et al, Spherical Assembly of Halloysite Clay Nanotubes as a General Reservoir of Hydrophobic Pesticides for pH-Responsive Management of Pests and Weeds, *Small* (2024). [DOI: 10.1002/sml.202402921](https://doi.org/10.1002/sml.202402921)

Provided by Chinese Academy of Sciences

Citation: Researchers fabricate eco-friendly pesticide delivery system (2024, June 19) retrieved 21 June 2024 from <https://phys.org/news/2024-06-fabricate-eco-friendly-pesticide-delivery.html>

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