

## Novel system for highly sensitive detection of small molecule pollutants in food and the environment

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CFICA and its technical principles. Credit: Wang Shu

A research team from the Hefei Institutes of Physical Science of Chinese Academy of Sciences, developed a novel competitive dualchannel color-tone change fluorescent immunochromatographic assay (CFICA).



"This new invention enables ultrasensitive detection of pesticide and veterinary drug residues," said Assistant Prof. Wang Shu, a member of the team. The research results were <u>published</u> in *Sensors and Actuators: B. Chemical.* 

Excessive pesticide and <u>antibiotic use</u> can cause neurotoxicity, <u>endocrine</u> <u>disruption</u>, and cancer. Therefore, developing affordable, convenient, and sensitive detection technology is crucial for <u>food safety</u> and sustainable agriculture.

Immunochromatographic assays (ICA) are promising for on-site rapid detection due to their low cost and ease of use. However, their application for detecting trace-level <u>small molecules</u> is limited by insufficient sensitivity and semi-quantitative results.

In this study, researchers used polyethylenimine (PEI) self-assembly technology to prepare silica core double-layer quantum dot shell composite fluorescent labels in three different colors: red, green, and blue. The green and blue fluorescent labels were used as detection probes, while the red labels were used as encapsulation probes. This approach led to the development of a new competitive dual-channel CFICA.

The system proved highly effective in detecting the antibiotic kanamycin (KAN) and the fungicide carbendazim (CBZ) in real samples like milk, tea, <u>lake water</u>, and soil. It's at least 100 times more sensitive than current maximum residue limits (MRLs).

They also created a handheld fluorescence reader to conveniently measure the multicolor signals on CFICA strips quantitatively.

"We believe this system has strong potential for practical applications," said Wang Shu.



**More information:** Zhenmei Wang et al, A novel competitive colortone change fluorescence immunochromatographic assay for the ultrasensitive detection of pesticide and veterinary drug residues, *Sensors and Actuators B: Chemical* (2024). DOI: 10.1016/j.snb.2024.136125

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