**“Three-in-one” Multifunctional Nanohybrids with Fluorescence**

**for Sensitive Paper-based Biosensing of Pathogens**

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Our research aims to exploit the exceptional properties of lateral flow assay-based (LFA) multifunctional nanomaterials to developed improved requirements for rapid and reliable food safety control demands new sensing techniques with excellent performance. Our approach centres on the fabrication of magnetic nanobeads (MNBs) core-shell structure with defective metal organic frameworks-based (MNB@MOFs) biosensors using of high sensitivity, accuracy, and reliability for analysis of food contaminants. This technology utilises boronic acid on the surface of defective MOFs and demonstrated the triple functions of foodborne pathogen detection: (i) instead of recognizing bacteria with antibodies, this test has the advantages of easy preparation and low price; (ii) as a fluorescent label for rapid and highly sensitive detection of pathogenic bacteria; (iii) the ability to enrich targets from large complex samples. The functionalization of the NC membrane with antibodies, aptamers or-nanobodies enables the specific capture of target. MNB@MOFs labelled bacteria as complex conjugates added into the sample pad, upon binding events between the immobilized bioreceptors and the conjugates, discernible changes in the test line are observed enabling rapid and sensitive detection of bacteria. The combination of nanomaterial-based sensors offers a promising avenue for point-of-care detection that can range from food safety to health diagnostics.