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(57) Abstract :
The present invention relates to a microfluidic device (100) for rapid detection of bacterial pathogens. The device (100) comprises microchannels (110) with pathogen-specific ligands, biosensor chambers (120), detectors (130), valves (140), and pumps (150). It enables rapid, sensitive, and multiplex bacterial detection using minimal sample volume. The disposable cartridge design ensures biosafety, while the reusable reader (200) provides portability and wireless data display. Experimental validation confirmed high sensitivity, detecting as low as 100 CFU/mL, establishing suitability for clinical, food safety, and environmental applications.

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