



sensors



Special Issue Reprint

Recent Advances in Sensors for Chemical Detection Applications

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Low-cost sensor technologies for chemical detection are increasingly used in industrial process control, chemical threat monitoring, green chemistry, environmental sustainability, smart cities, hydrogen economy, energy saving, wearable devices, IoT, public health, sustainable mobility, autonomous vehicles, and community sensing. Functional materials are key enablers of advanced gas sensors, bridging laboratory research and industrial applications. Essential requirements for next-generation low-cost sensors include low power consumption, high-quality data, and reliable performance. Portable systems and wireless sensor networks are widely employed for long-term chemical threat monitoring. Current low-cost sensor technologies encompass various transducers—chemiresistive, electrochemical, transistor, optical, mass-sensitive, catalytic, and hybrid types. Despite rapid progress, challenges persist in sensitivity, selectivity, stability, detection limits, calibration, and accuracy. Understanding these limitations is critical to expanding chemical detection capabilities.

This Special Issue focuses on low-cost sensor technologies, gas and chemical sensors, functional materials, sensor nodes, hardware design, data communication, system integration, testing methods, signal processing, calibration, machine learning, and innovative applications. Proper calibration in both laboratory and field conditions ensures data reliability. These sensing solutions are highly relevant for biochemical detection and gas monitoring across environmental and industrial scenarios.



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