Special Issue

Nanoparticle-Based (Bio)Sensors for Biomedical and Environmental Monitoring

Message from the Guest Editors

Nanoparticles have emerged as powerful tools in sensor technology, offering enhanced sensitivity, selectivity, and rapid response times. Their unique physicochemical properties, including high surface area-to-volume ratios and tunable optical, electrical, and chemical characteristics, make them ideal candidates for applications in both biomedical and environmental monitoring. Nanoparticle-based (bio)sensors include, metallic nanoparticle sensors, quantum dot (QD) sensors, carbon-based nanoparticle sensors, and magnetic nanoparticle sensors.

Despite their advantages, nanoparticle-based (bio)sensors face challenges such as stability, reproducibility, and potential toxicity. Future advancements will likely focus on improving biocompatibility, miniaturization for portable devices, and integration not only with mobile phones but also with artificial intelligence for real-time data analysis.

Nanoparticle-based (bio)sensors hold great promise for advancing biomedical diagnostics and environmental safety. Their continued development will enhance the precision, efficiency, and accessibility of monitoring systems, contributing to improved health and sustainability outcomes.

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Deadline for manuscript submissions

closed (31 January 2026)

Micromachines

an Open Access Journal by MDPI

Impact Factor 3.0
CiteScore 6.0
Indexed in PubMed

mdpi.com/si/236992

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