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PTFOS SVEUČILIŠTE JOSIPA JURJA STROSSMAYERA U OSIJEKU
Prehrambeno-tehnološki fakultet Osijek

ELEKTROKEMIJSKI LAB-ON-CHIP BIOSENZOR ZA PRAĆENJE BISFENOLA A U VODENIM SUSTAVIMA

ELECTROCHEMICAL LAB-ON-CHIP BIOSENSORS FOR BISPHENOL A MONITORING IN WATER SYSTEMS

Ivana Tomac[1*], Gjino Šutić[2], Ines Šiško Markoš [3,4], Marija Stjepanović[1], Natalija Velić[1]
[1]Josip Juraj Strossmayer University of Osijek, Faculty of Food Technology Osijek, F. Kuhača 18, 31 000 Osijek, Croatia
[2]UR Institute, Bleiweisova 15, Zagreb, Croatia
[3]Catholic University of Croatia, School of Medicine, Ilica 244, 10 000 Zagreb, Croatia
[4]University Hospital Centre Sestre Milosrdnice, Vinogradska cesta 29, 10 000 Zagreb, Croatia
*itomac@ptfos.hr

Contaminated Water

BPA is a widespread endocrine-disrupting pollutant that threatens aquatic ecosystems and human health.

Lab-on-Chip Biosensor

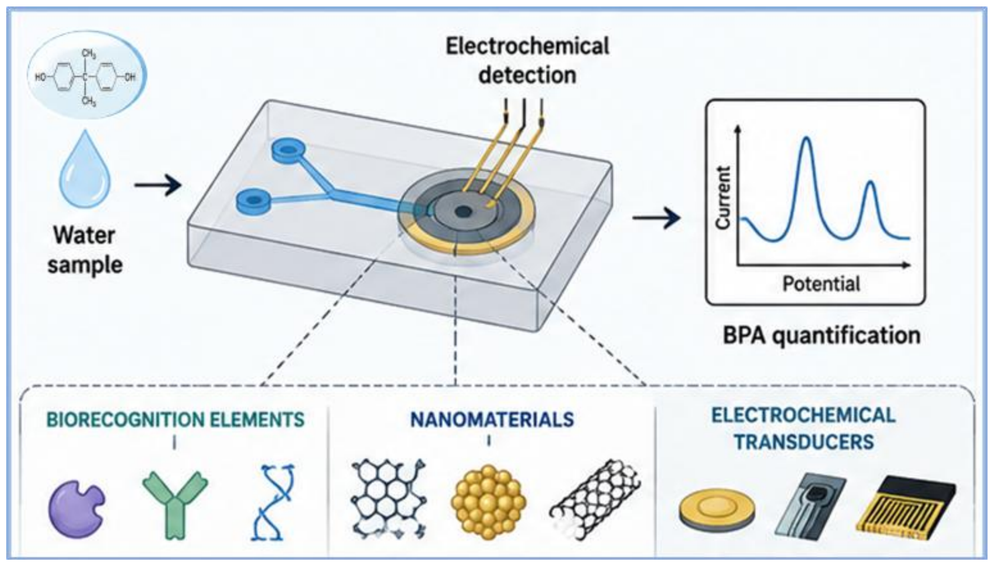
Nanostructured electrodes on a microfluidic chip capture BPA using a biorecognition layer.

Electrochemical Signal

BPA binding produces a measurable current change, enabling sensitive, selective quantification.

Portable On-Site Monitoring

Miniaturized, low-cost devices deliver rapid, real-time water-quality results in the field.



Interchangeable Biorecognition Elements

Enzymes
e.g., tyrosinase

Antibodies
immunosensors

Aptamers
synthetic oligonucleotides

Bisphenol A (BPA) is a widespread organic pollutant that is considered a significant threat to aquatic ecosystems and human health due to its endocrine-disrupting activity. In recent years, numerous analytical approaches have been developed for its determination, among which electrochemical biosensors integrated into lab-on-chip platforms have attracted increasing attention because of their high sensitivity, selectivity, portability, and potential for real-time analysis. This review provides an overview of recent advances in the development of electrochemical lab-on-chip biosensors for BPA detection in water systems. Particular emphasis is placed on different types of biorecognition elements, including enzymes, antibodies, and aptamers, as well as on the role of nanostructured materials in enhancing the analytical performance of sensing platforms. The advantages of miniaturization, microfluidic integration, and the applicability of these devices for on-site environmental monitoring are also discussed. A review of the available literature confirms that electrochemical lab-on-chip biosensors represent a promising technology for the rapid, reliable, and cost-effective monitoring of BPA in water systems, with considerable potential for broader applications in environmental protection and water quality assessment.