# Ferromagnetic Nanoparticles-modified Immunosensor: A Novel Methodology for Polycyclic Aromatic Hydrocarbons (PAHs) Detection.

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**Abstract:**

Polycyclic aromatic hydrocarbons (PAHs) encompass an extensive group of organic compounds comprised solely of carbon and hydrogen elements. These substances exert a significant influence as contaminants in the environment, bearing notable implications. Given their link to heightened cancer risks in humans, PAHs raise significant human health apprehensions. Consequently, establishing a means to identify these compounds in various substances that humans come into contact with, such as water, soil, and food, is paramount. The European Drinking Water Directive (98/83/EC) prescribes a stringent threshold of 0.01ng/mL for Benzo[a]pyrene (BaP) levels in potable water. Traditional practices for PAH detection in the environment have relied on costly instruments like High-Performance Liquid Chromatography with fluorescence detection (HPLC-fluorescence) and Gas Chromatography-Mass Spectrometry (GC-MS). These methodologies entail substantial expenses, employ significant quantities of hazardous solvents, demand substantial time investments, and lack portability. In this research, an alternative electrochemical approach was introduced, offering distinct advantages over established PAH detection techniques. The method achieved a Limit of Detection (LOD) at 0.01ng/mL and a linear range spanning from 13.7 to 123 ng/mL. This innovative technique also facilitates the automation of steps inherent to immunoassay procedures. Consequently, integration into a portable lab-on-a-chip solution holds promise as a prospective avenue for monitoring water quality. This approach circumvents the need for resource-intensive and inefficient water sample analyses conducted within dedicated laboratories, thus mitigating costs and enhancing efficiency.

**Keywords:** Immunsensor, immunoassay; ELISA; ferromagnetic nanoparticles; polycyclic aromatic hydrocarbons (PAHs).