Air-driven carrier system for eco-friendly flow-based electroanalysis

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The search for greener electroanalytical methods has motivated the development of an innovative micro/milli-fluidic system that uses air as carrier, replacing the traditional liquid carriers [1]. This approach facilitates precise injections of electrolyte solutions while mitigating issues commonly associated with flow-based electrochemical systems, such as air bubble interference. Herein, we developed an electroanalytical platform built in PDMS with dual-mode electrochemical detection that uses air to drive analyte/sample solutions in channel. Tests performed with redox probes, salicylic acid and aqueous samples (river, lake and groundwater) demonstrated its efficiency and practical applicability, showing that the air-driven system consistently produces more intense and well-defined peak currents. The increased signal was attributed to the minimal dilution of the analyte during transport from the injector to the electrodes [2]. In addition, the device ensures less channel clogging, minimal electrode contamination besides less consumption of supporting electrolyte solutions. The air-driven method — developed to determine salicylic acid and aqueous samples — showed superior ecological performance to the traditional liquid stream, generating better scores on the AGREE index thanks to the reduction of waste generation provided by lower volume of injected sample. Thus, the air-based system effectively replaces conventional liquid flow in electroanalysis, aligning with green analytical chemistry principles.

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References:

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