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An electronic tongue for water monitoring employed flow system

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Abstract – A flow analysis system based on multicommutation combined with the electronic tongue to assess the quality of water samples was developed for the creation of a database with information on water quality. Initial studies involving the preparation, characterization and development of sensory modules, using conductive polymer films (POEA, POEA/PSS, POEA/PEDOT, PEDOT and PEDOT/PSS) for monitoring aquatic environments were conducted. Predictions were performed by using principal components analysis (PCA) and a good discrimination between different water samples was found. These studies have provided indicative of the possibility of discrimination of different types of water samples.

The water monitoring by sensors is attractive when applied in the water treatment [1]. Deterioration in water quality at the source can be readily detected and corrections future in the treatment procedure carried for avoiding a poor quality water. For this purpose the automation of the monitoring is desirable because it facilitates the acquisition of data and detect, quickly, which the parameter out of compliance. In the context can highlight the use of flow analysis systems, which allows easy automation and incorporation of these sensors to the system of water treatment [2]. The main objective this work is development of a flow system based on multicommutation combined with the electrochemical detectors last generation (electronic tongue) for monitoring the quality of water [3].

Thin films of conducting polymers were deposited on spiral and interdigitated electrodes made of graphite in PET (polyethylene terephthalate) of transparencies films for laser printer [4]. The fabrication of ultra thin films was performed by self-assembly technique. Monitoring the deposition of thin films based on the quantity of material deposited in each layer and the effect of doping were performed by UV-Vis. Different sensing units in which were deposited thin films of conducting polymers and their mixtures with sensitive materials (POEA, POEA / PSS, POEA / PEDOT, PEDOT and PEDOT / PSS) were used. These sets of sensory units were exposed to different sample compositions and performance of the sensors was evaluated on the basis of electrochemical characteristics. Through PCA analysis, it was possible to discriminate different types of mineral waters and still distinguish these solutions from those containing metals.

The developments of graphite sensors on PET are promising due to its low cost and ease of manufacture. Their employ in flow analysis systems enable of the construction of analysis modules with features cheap disposable quality for continuous monitoring systems. Partial studies of the interaction of polymeric films with the constituents of water provide indicative of the possibility of discrimination of different types of water samples and proved to be suitable for the proposed objective.

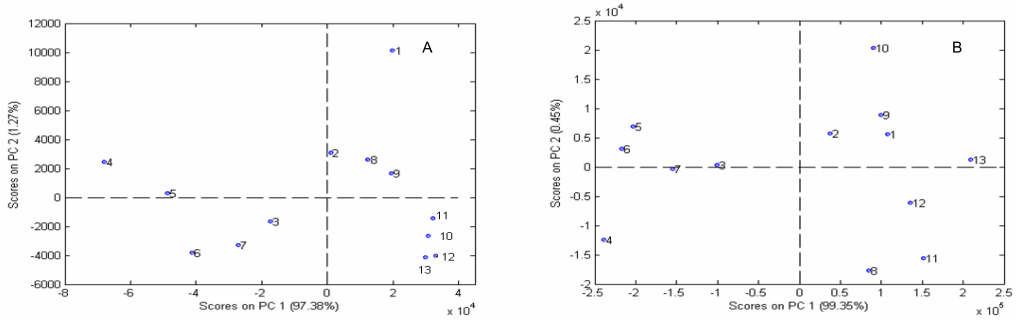

Figure 1: PCA obtained through the responses acquired by the sensor array electrodes with polymeric interdigitated (A) and spiral (B) electrodes: **1**, ultra pure water; **2**, distilled water; **3**, tap water; **4**, mineral water **a**; **5**, mineral water **b**; **6**, mineral water **c**; **7**, mineral water **d; 8**, distilled water + 0,001 mg L^{-1} Cd^{2+}; **9**, distilled water + 0,01 mg $L^{-1}Cu^{2+}$; **10**, distilled water + 0,025 mg L^{-1} Ni^{2+}; **11**, distilled water + 0,3 mg L^{-1} Fe^{3+}; **12**, distilled water + 0,1 mg $L^{-1}Mn^{2+}$; **13**, distilled water + 1,0 mg L^{-1} Ba^{2+}.

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