

Flexible chemical sensors based on electrodeposited polymers

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Mots-clés : Chemical Sensors, Conducting polymers,

Résumé :

Conductive polymers are of great interest as sensitive layers in sensors operating in liquid environments due to their unique combination of electrical conductivity and chemical versatility. These materials can interact with various chemical or biological species in solution, leading to measurable changes in their electrical properties, such as conductivity, current or potential. Their tunable surface chemistry and ease of processing allow for the development of highly selective and sensitive sensors, useful in applications such as environmental monitoring, biomedical diagnostics, and industrial process control [1].

That is why we developed electrochemical sensors based on conductive polymers to detect both pH changes [2] and variations in bioanalytes (urea, dopamine...) [3,4]. To enhance the sensitivity and selectivity of these sensors, enzymes or nanoparticles have been incorporated into the polymer layer. The integration of these functional components within the conducting polymer matrix allows for more efficient and selective interactions with target analytes, thereby improving the overall performance of the sensors.

In particular, we developed flexible sensors using electrodeposited polyaniline films as pH-sensitive layers to manufacture pH sensors that are effective even in oxidizing environments. On one hand, the choice to use flexible sensors is explained by the fact that flexible sensors are becoming more and more important today due to their lightness, conformability, wearability, customizability, and versatility. On the other hand, conductive polyaniline films are lightweight, resistant and can be easily deposited on flexible substrates.

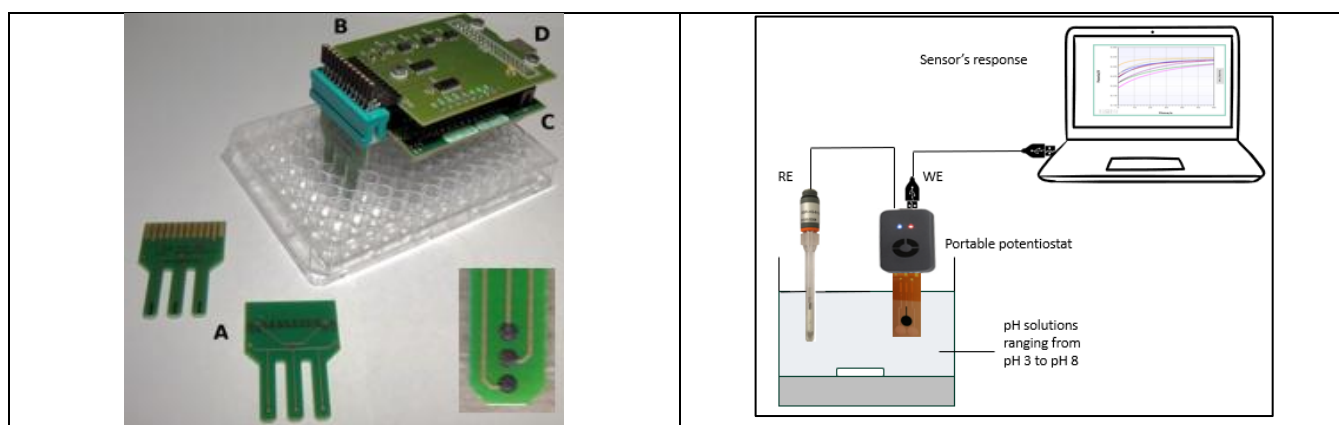


Figure 1. Left: Portable potentiostat and sensors for the measurement of urea concentrations. Right: Set-up for pH measurements using a flexible polymer-based sensor.

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