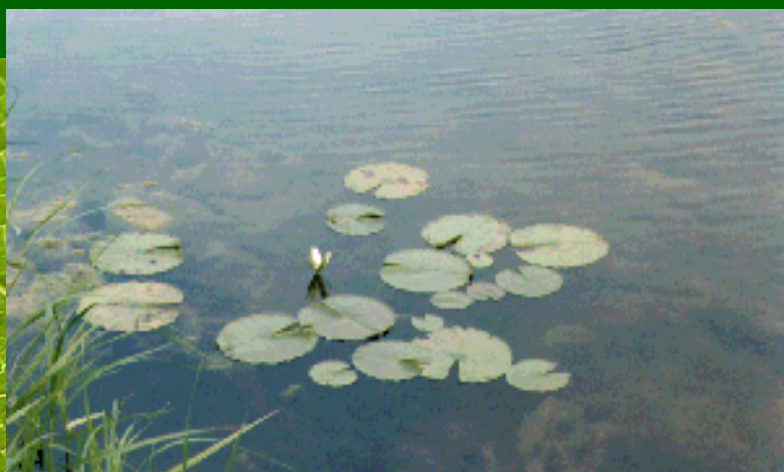
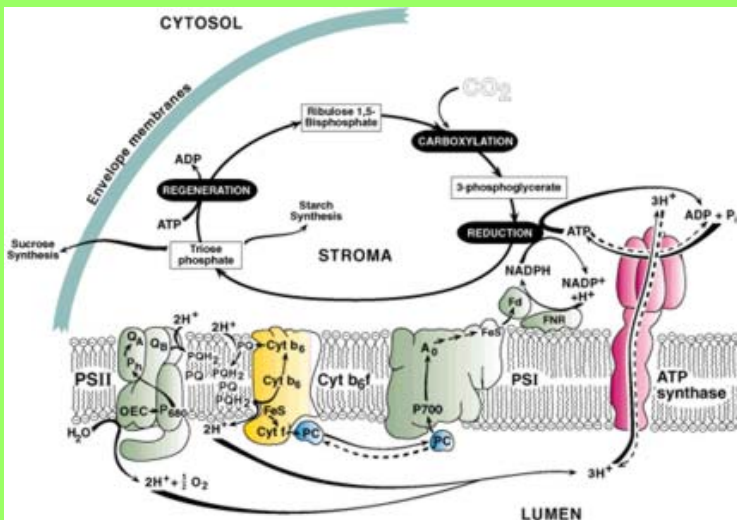
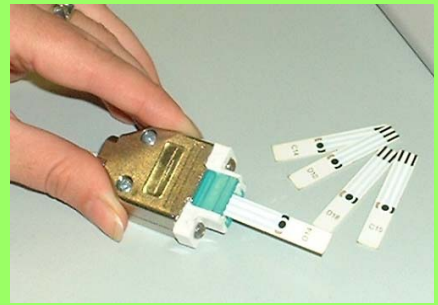


Electrochemical PSII based biosensor for a rapid detection of herbicides



Ready to use strips

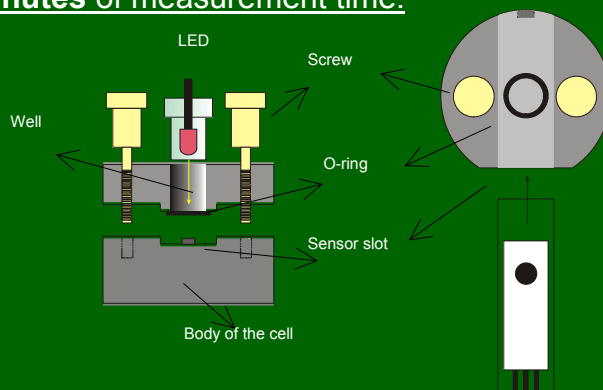
Carbon based screen-printed electrodes (SPCEs) are used to develop a one-shot-measure biosensor for the detection of photosynthetic inhibitors (herbicides, heavy metals) in discrete samples.



The measurement was based on the electrochemical evaluation of the activity of photosystem II (PSII), a protein complex present in the photosynthetic organisms and involved in the photosynthesis. Thylakoid membranes from spinach leaves, containing PSII have been used to modify the electrode surface of SPCEs.

Fast

The coupling of the developed biosensor with a custom-made cell allows to perform tests using 50 µL of sample solution within 10 minutes of measurement time.



Disposable

After each measurement, the modified sensor can be easily removed and replaced with a new one. This will avoid problem related to protein complex inactivation.

Easy to use

The modified SPCEs can be easily manipulate using a simple experimental procedure (see user data sheet).

Principle of measurement

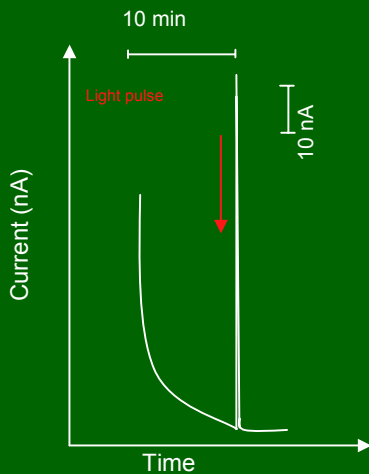
The illumination of electrode surface achieved by a high-intensity LED at a wavelength of 650 nm activate the light reaction in PSII present on the sensor surface

The obtained current signals are correlated with the photosynthetic activity

The relationship between the signal obtained with a blank and a herbicide-containing solution allowed the calculation the inhibition values, using the following formula.

$$[(I_{\text{blank}} - I_{\text{sample}}) / I_{\text{blank}}] * 100$$

where I_{blank} was the current value obtained for the only buffer (blank solution) and I_{sample} the value obtained for different inhibitors concentrations.



Good performances

In the table the inhibition values obtained using the PSII- based biosensor in presence of different inhibitors concentrations (between $10^{-6} \div 10^{-8}$ M) are reported.

Concentration (ppm)	Inhibition % *			
	Diuron	loxynil	Cd ²⁺	Atrazine
0.2	93	98	74	89
0.003	59	41	12	14

*RSD% =10%

Suitable for in field measurements

The instrumental setup can be assembled in order to allow the used of the PSII- based biosensors for in situ measurements



This biosensor is a useful device for the rapid screening of polluted samples