

# Non-enzymatic ethanol sensor based on a nanostructured disposable screen-printed electrode

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Herein, a simple and fast method for the electrocatalytic detection of ethanol using disposable screen-printed carbon electrodes (SPCEs) modified with platinum nanoparticles (PtNPs) is presented. The catalytic properties of PtNPs are employed in the oxidation of ethanol and the electrochemical results obtained revealed that PtNPs can effectively enhance the electron transfer between the analyte of interest and the electrode. Moreover, the content of ethanol is assayed in different alcoholic beverages (beer and wine). Additionally, an alcohol-free beer is also analyzed. The results obtained corroborated the applicability of the developed sensor as a trustful analytical screening tool. The obtained results are in accordance with the tolerances for indication of alcoholic strength by volume in the labeling of alcoholic beverages allowed by EU Laws [1].

The electrochemical cell consists of:

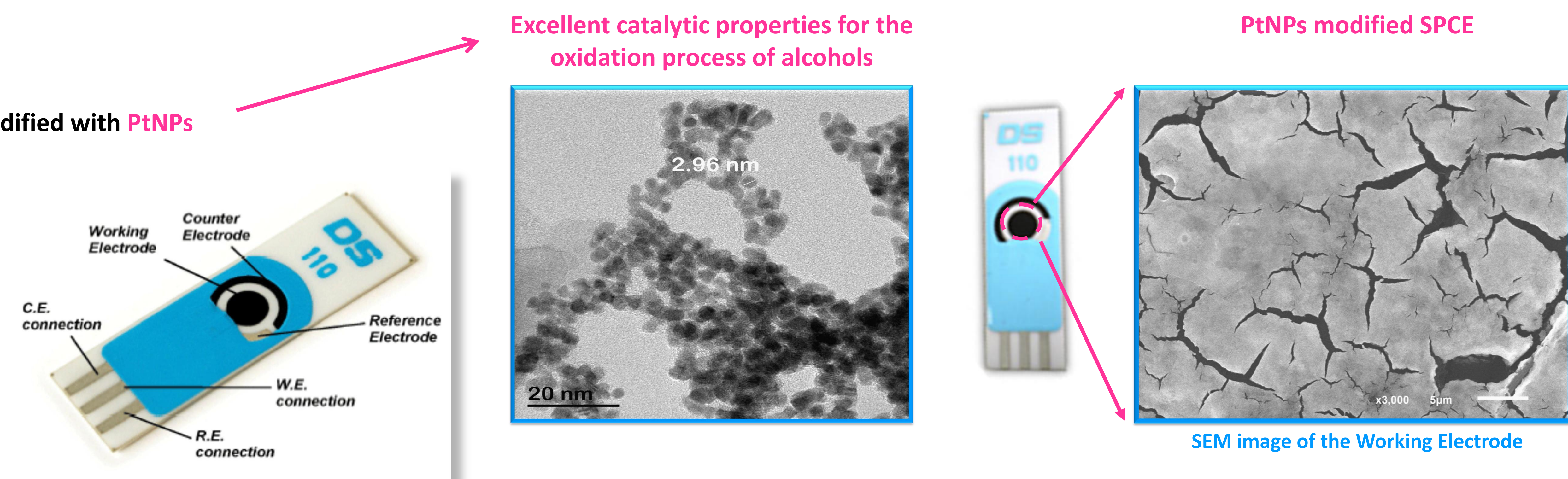
Working electrode (WE): Carbon (4 mm diameter) modified with PtNPs

Counter electrode (CE): Carbon

Reference electrode (RE): Silver

Ceramic substrate: L 3.4 cm x W 1.0 cm x H 0.05 cm

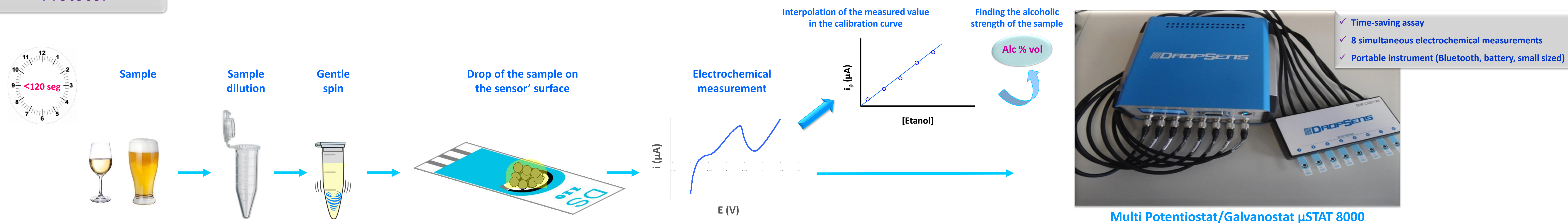
Electric contacts: Silver



[1] European Commission: Commission Directive 87/250/EEC on the indication of alcoholic strength by volume in the labelling of alcoholic beverages for sale to the ultimate consumer. Off J Europ Comm 1987,L113:57-58.

## Ethanol determination: electrocatalytic sensing

### Protocol

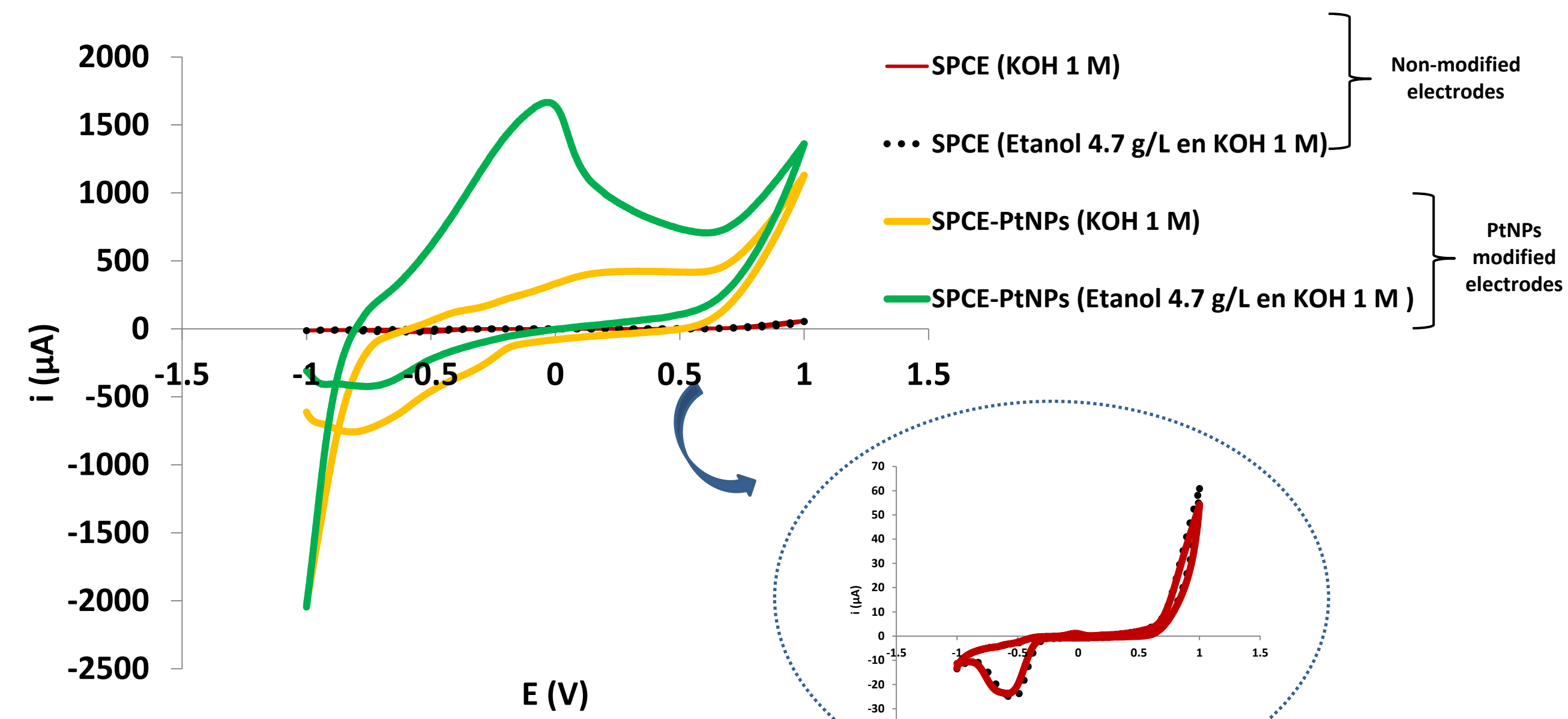


Multi Potentiostat/Galvanostat μSTAT 8000

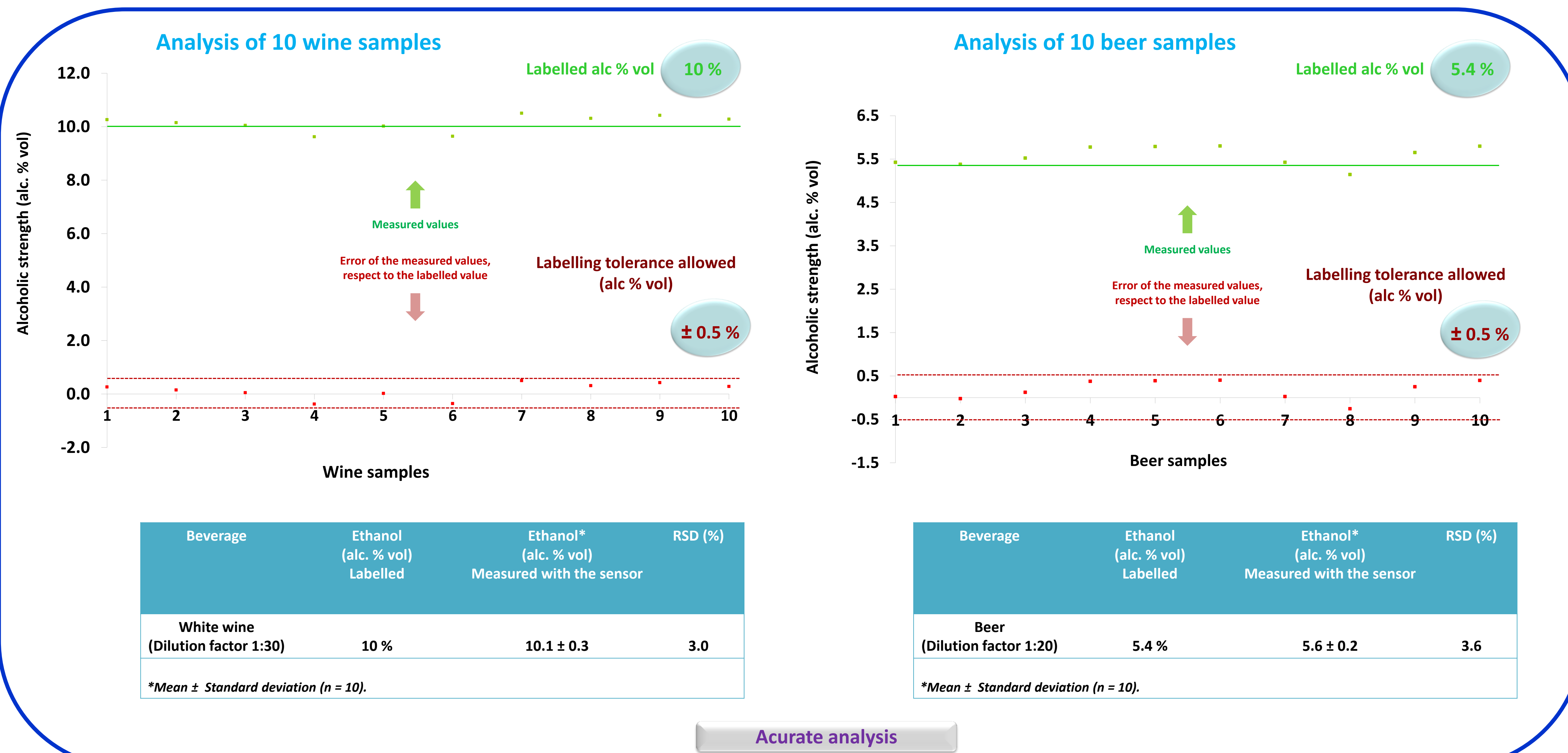
- ✓ Time-saving assay
- ✓ 8 simultaneous electrochemical measurements
- ✓ Portable instrument (Bluetooth, battery, small sized)

### Results

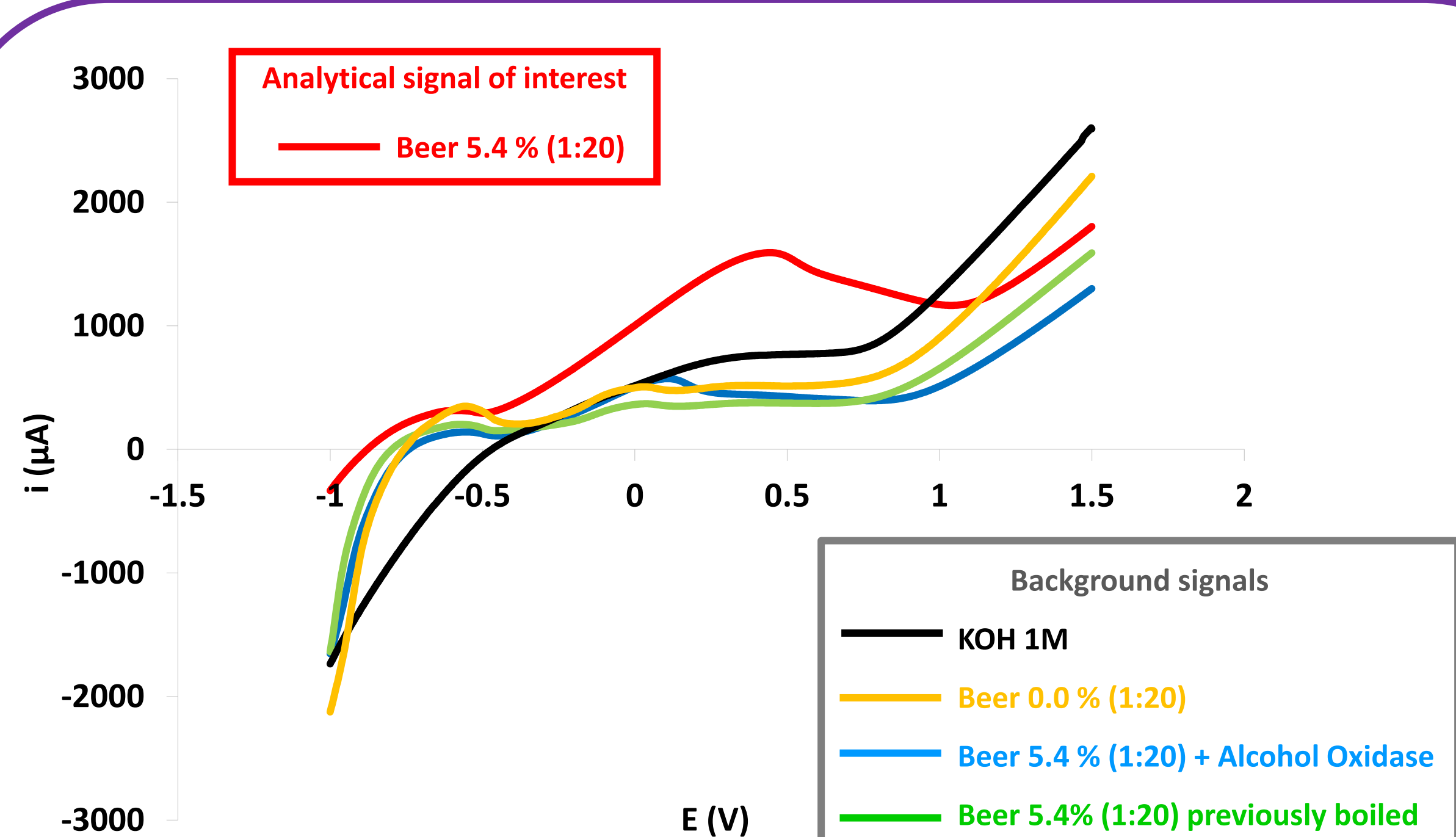
#### Ethanol electrooxidation on SPCE-PtNPs



#### Real samples



#### Specific analysis



### Final remarks

- A disposable enzyme-free ethanol sensor based on a catalytic nanomaterial technology was developed.
- The developed sensor was used to determine the ethanol strength in wine and beer samples. The assay takes less than 120 seconds.
- The results were accurate and respect the tolerances allowed by EU law for the indication of alcoholic strength in the labelling of the beverages.