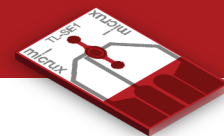


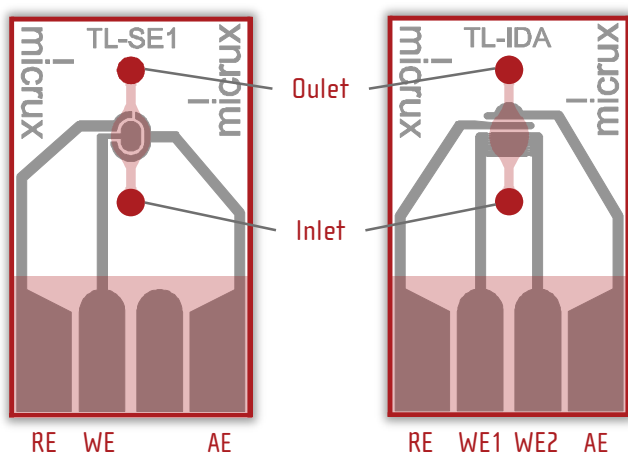
# Microfluidic Electrochemical Sensors



Microfluidics and electrochemical sensors are integrated in a single chip by thin-film technologies. Integrated thin-layer hybrid SU-8/Glass chips offer a suitable analytical solution for multiple applications.

## » Microfluidic Electrochemical Sensors features

Thin-film technologies enable the integration of microfluidics and (micro)electrodes in an small chip with high resolution and precision.



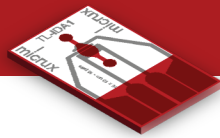
» External dimensions:	10 x 6 x 0.8 mm
» Substrate:	Glass
» Microfluidic stage:	SU-8 resin
» Channel width:	250 $\mu$ m / 1 mm (EC cell)
» Channel height:	40 $\mu$ m
» Channel volume:	55 nL
» Inlet / outlet:	0.7 mm $\varnothing$
» Electrode material:	Platinum or Gold

## » Thin-film electrode packs

Microfluidic EC Sensors are supplied in 20 units packs. They should be stored at room temperature in a dry place.

## » Applications

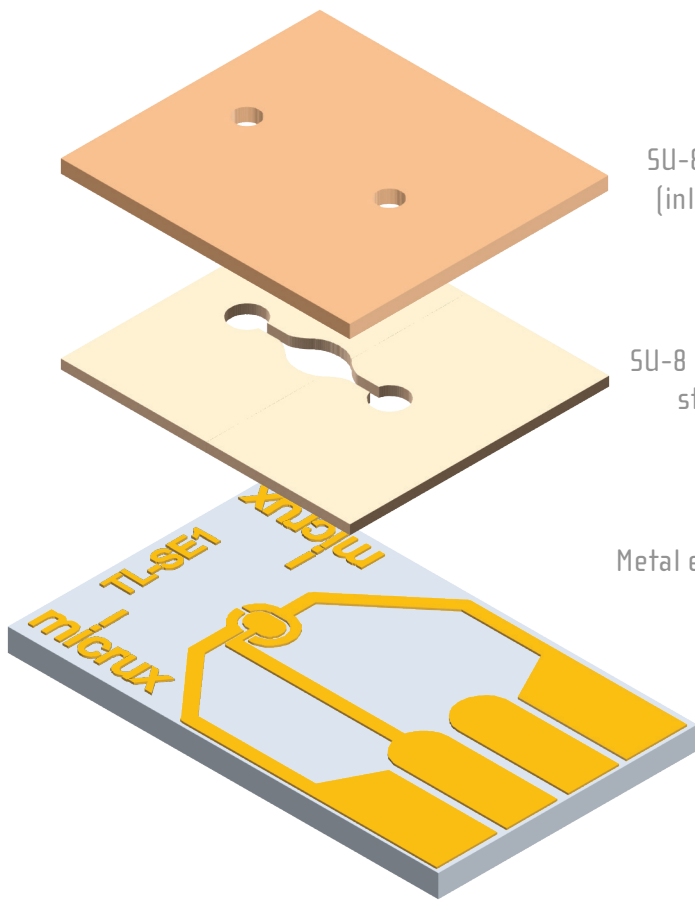
Integrating microfluidics with electrochemical sensors allow to improve the control of fluids on the electrode surface. Microfluidic electrochemical sensors are used as thin-layer based flow-cell in flow injection analysis (FIA) systems. Microfluidics enable the accurate control of low sample/ reagents volume (55 nL internal channel volume) through the electrodes. It offers several advantages for the modification of the electrode surface and the development of chemical sensors and biosensors.



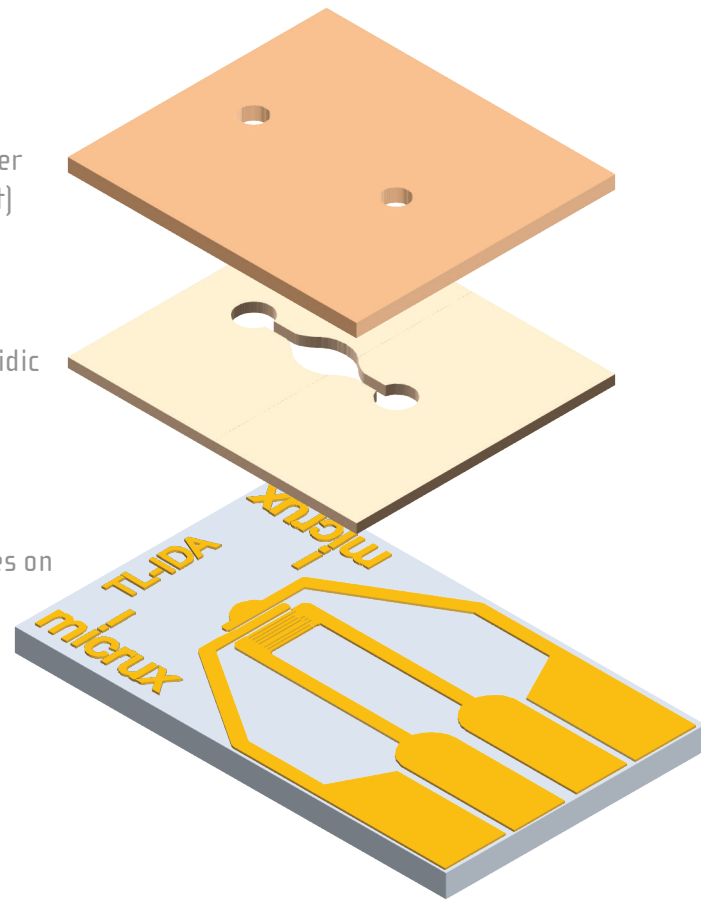
## » Microfluidic / electrochemical structures

Different **single-electrodes (SE)** or **interdigitated array (IDA)** microelectrodes are integrated on the microfluidic structure on-chip. The basic **microfluidic structure (single-channel)** is manufactured in **SU-8 resin** on a **glass** substrate containing the metal-based **(micro)electrodes**.

### » Microfluidic single-electrode (SE)

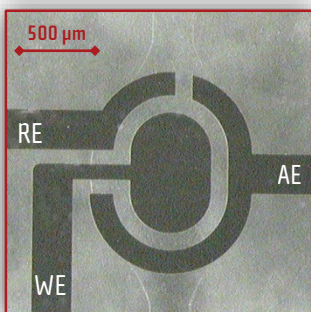


### » Microfluidic interdigitated array (IDA)

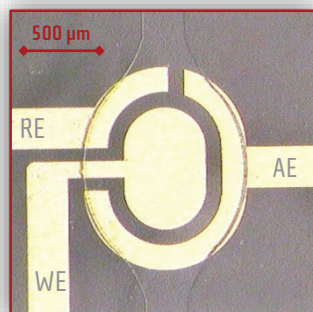


## Electrochemical Cell

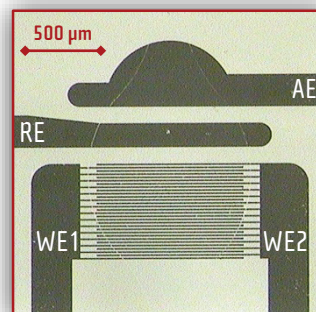
» TL-SE1-Pt



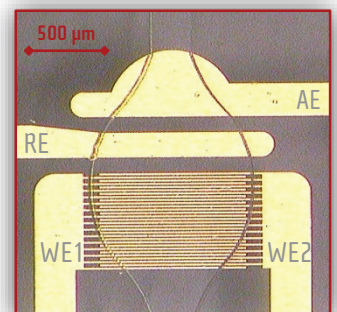
» TL-SE1-Au



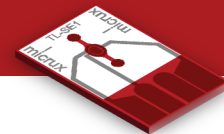
» TL-IDA-Pt



» TL-IDA-Au



Microfluidic channels enable a high control of the samples/fluids through the electrode surface. Thus, the electrochemical reactions, modifications and other processes related to the electrode surface are enhanced.

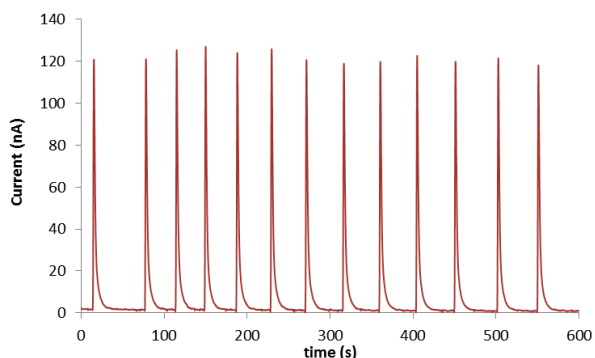


## » Microfluidic Single-Electrode Sensors

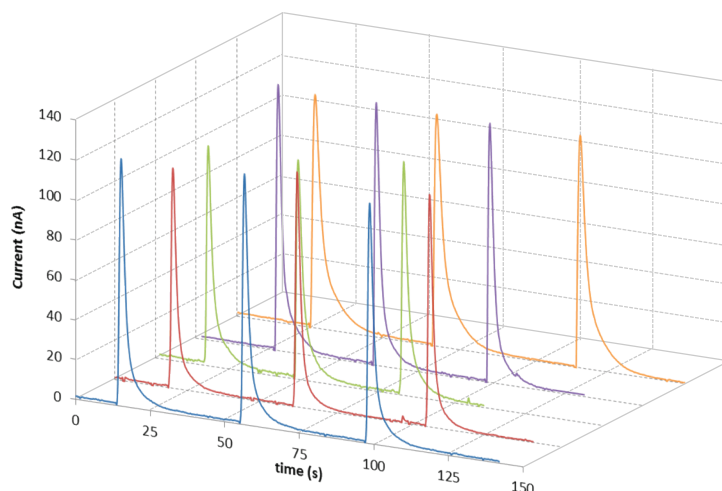
Single electrodes integrated on thin-layer chips are available in platinum and gold.

Reference	Material	WE area	Thickness
» TL-SE1-Pt	Ti/Pt	0.3 mm <sup>2</sup>	50/150 nm
» TL-SE1-Au	Ti/Au	0.3 mm <sup>2</sup>	50/150 nm

### » Precision Intra- & Inter-chip



Successive injections of  $1 \cdot 10^{-5}$  M pAP in a FIA system using a thin-layer microfluidic single platinum electrode (TL-SE1-Pt). Carrier: 0.1 M PBS, pH = 7.4, flow rate = 1,0 mL/min,  $E_d = +0.4$  V. RSD = 2%, n = 13.



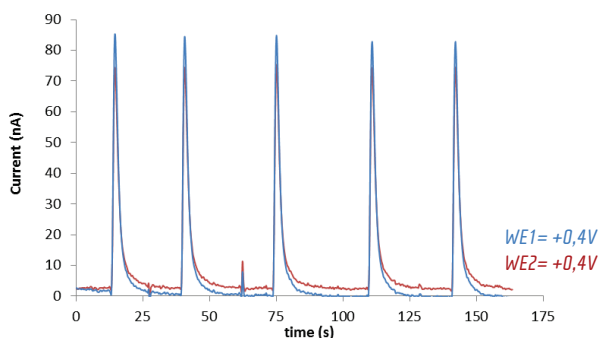
Amperometric response for  $1 \cdot 10^{-5}$  M pAP in a FIA system using different thin-layer microfluidic chips (TL-SE1-Pt).

## » Microfluidic Interdigitated Array Sensors

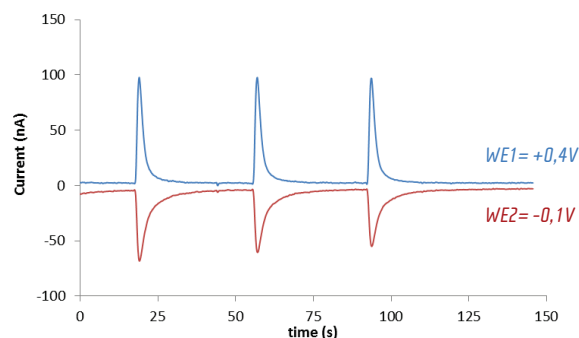
Interdigitated microelectrodes integrated on thin-layer chips are available in platinum and gold with different sizes.

Reference	Material	$\mu$ Electrode width	$\mu$ Electrode gap	Number of feet	Thickness
» TL-IDA1-Pt	Ti/Pt	10 $\mu$ m	10 $\mu$ m	15 pairs	50/150 nm
» TL-IDA1-Au	Ti/Au	10 $\mu$ m	10 $\mu$ m	15 pairs	50/150 nm
» TL-IDA5-Pt	Ti/Pt	5 $\mu$ m	5 $\mu$ m	30 pairs	50/150 nm
» TL-IDA5-Au	Ti/Au	5 $\mu$ m	5 $\mu$ m	30 pairs	50/150 nm

### » Same detection potential



### » Different detection potential

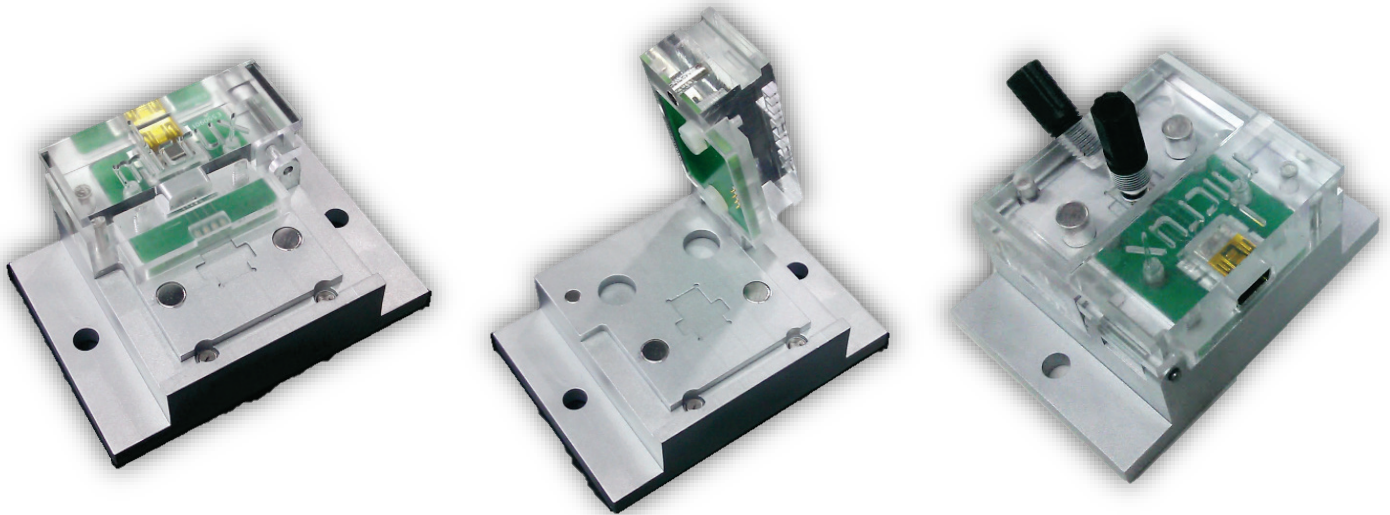


Amperograms for  $1 \cdot 10^{-5}$  M pAP in a FIA system using a thin-layer microfluidic interdigitated array platinum electrode (TL-IDA1-Pt) applying same and different detection potentials. Carrier: 0.1 M PBS, pH = 7.4, flow rate = 1,0 mL/min.



## » Microfluidic sensors related accessories

Microfluidic sensors are compatible with the innovative **All-in-One (AIO)** platform. The **AIO cell (Ref. ED-AIO-CELL)** provides an **unique multipurpose** interface with **movable add-ons** that can be easily **interchanged** for using the standard (10 x 6 mm) chips.



A special **add-on** has been developed to enable the use of microfluidic electrochemical sensors in a **flow system** with a **thin-layer** approach. The **thin-layer based flow-cell** improves the control of fluids getting **better precision** with **lower dead volume** and **low sample** requirements.

### » Thin-layer Add-on (Ref. TL-PMMA-1,0 / TL-PEEK-1,0)



Thin-layer add-on is available in **PMMA** or **PEEK**. **Add-ons TL-PMMA-1,0 & TL-PEEK-1,0** are compatible with the microfluidic electrochemical sensors, **TL-SE1, TL-IDA1 & TL-IDA5**. The add-on is joined to the base-cell (AIO) by means of magnets. The inlet/outlet of the microfluidic channel is sealed with two 1,15 mm I.D. O-rings. The add-on integrates standard fluidic ports (¼" - 28 UNF) with inlet channel of 0.5 mm I.D.



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