

# Thin-film Electrochemical Sensors *(On-Demand)*



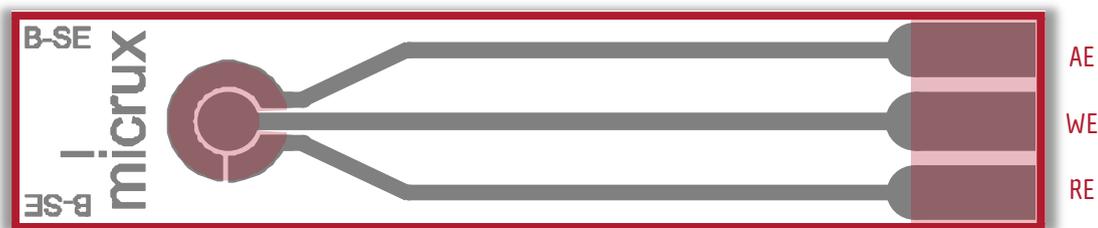
Thin-film technologies enable the manufacture of a wide variety of electrochemical sensors with multiple analytical applications. MicruX is able to manufacture *off-the-shelf* metal-based thin-film (micro)electrodes as well as other *pre-designed sensors on-demand*.

**On-demand sensors** are just manufactured under previous request. **Delivery time** for these sensors is about **7-8 weeks** depending on the workload.

## » Basic Single- & Multi-Electrode Systems

Different single- and multi-electrode chips, integrating one or more working electrodes (WE) as well as reference (RE) and auxiliary (AE) electrodes, are easily manufactured by using thin-film technologies.

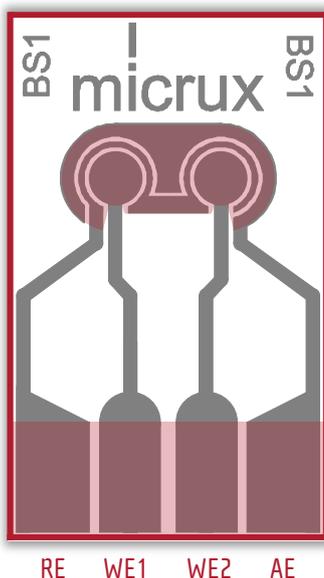
### » Single-Sensor



- » External dimensions: 17 x 3.5 x 0.7 mm
- » Substrate: Glass
- » Protective layer: SU-8 resin
- » Electrochemical cell: 2 mm Ø
- » Electrode material: Platinum or Gold

Reference	Material	WE area	Thickness
» ED-B-SE-Pt	Ti/Pt	0.8 mm <sup>2</sup>	50/150 nm
» ED-B-SE-Au	Ti/Au	0.8 mm <sup>2</sup>	50/150 nm

### » Dual-Sensor



- » External dimensions: 10 x 6 x 0.7 mm
- » Substrate: Glass
- » Protective layer: SU-8 resin
- » Electrode material: Platinum or Gold

Reference	Material	WE1 area	WE2 area	Thickness
» ED-BS1-Pt	Ti/Pt	0.8 mm <sup>2</sup>	0.8 mm <sup>2</sup>	50/150 nm
» ED-BS1-Au	Ti/Au	0.8 mm <sup>2</sup>	0.8 mm <sup>2</sup>	50/150 nm

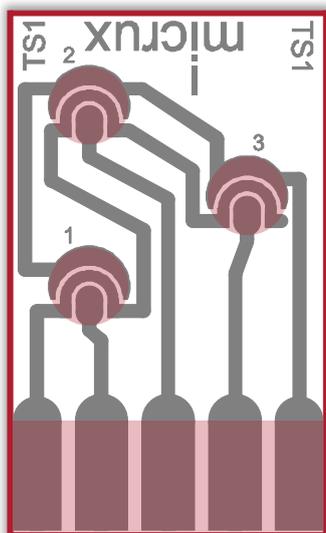
Dual-sensors are compatible with standard electrochemical platforms (Drop- & AID-cell)





## » Basic Single- & Multi-Electrode Systems

### » Tri-Sensor



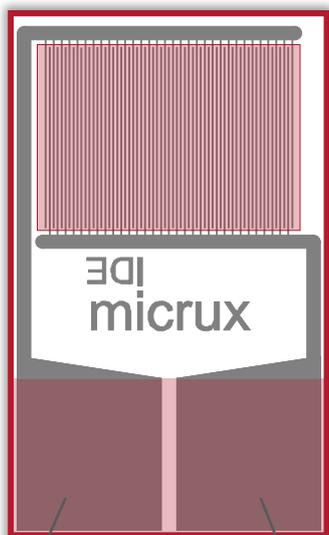
RE WE1 WE2 WE3 AE

- » External dimensions: 10 x 6 x 0.7 mm
- » Substrate: Glass
- » Protective layer: SU-8 resin
- » Electrochemical cells: 1.5 mm  $\varnothing$
- » Electrode material: Platinum or Gold

Reference	Material	WE1 area	WE2 area	WE3 area	Thickness
» ED-TS1-Pt	Ti/Pt	0.3 mm <sup>2</sup>	0.3 mm <sup>2</sup>	0.3 mm <sup>2</sup>	50/150 nm
» ED-TS1-Au	Ti/Au	0.3 mm <sup>2</sup>	0.3 mm <sup>2</sup>	0.3 mm <sup>2</sup>	50/150 nm

## » Basic Interdigitated Lineal Electrodes

The basic interdigitated lineal-band electrodes (IDE) consist of two individually addressable microelectrode array strips with an interdigitated approach.



WE1 pad

WE2 pad

- » External dimensions: 10 x 6 x 0.7 mm
- » Substrate: Glass
- » Protective layer: SU-8 resin
- » Electrochemical cell: 5 x 3.5 mm

Reference	Material	$\mu$ Electrode width	$\mu$ Electrode gap	Number of feet	Thickness
» ED-cIDE4-Pt	Ti/Pt	10 $\mu$ m	10 $\mu$ m	120 pairs	50/150 nm
» ED-cIDE5-Pt	Ti/Pt	10 $\mu$ m	5 $\mu$ m	160 pairs	50/150 nm
» ED-cIDE6-Pt	Ti/Pt	5 $\mu$ m	5 $\mu$ m	240 pairs	50/150 nm
» ED-cIDE4-Au	Ti/Au	10 $\mu$ m	10 $\mu$ m	120 pairs	50/150 nm
» ED-cIDE5-Au	Ti/Au	10 $\mu$ m	5 $\mu$ m	160 pairs	50/150 nm
» ED-cIDE6-Au	Ti/Au	5 $\mu$ m	5 $\mu$ m	240 pairs	50/150 nm

IDE sensors are compatible with standard electrochemical platforms (Drop- & AID-cell)



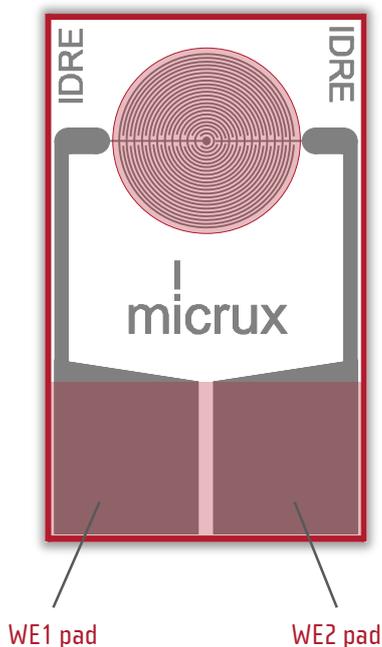
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## » Basic Interdigitated Ring Electrodes

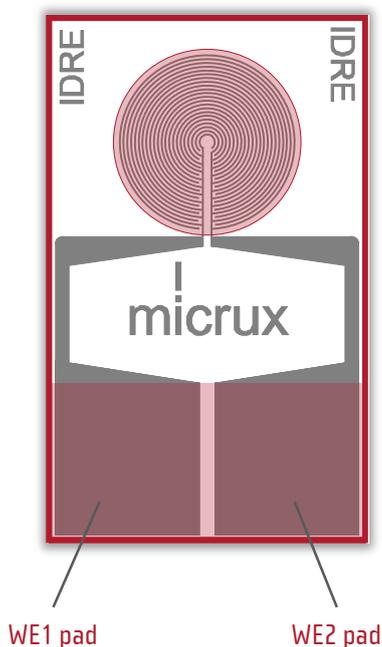
Two different ring approaches are available for the interdigitated ring electrodes, adapting their performance to several applications.

» External dimensions:	10 x 6 x 0.7 mm
» Substrate:	Glass
» Protective layer:	SU-8 resin
» Electrochemical cell:	3.5 mm Ø



### » IDRE approach (1)

Reference	Material	μElectrode width	μElectrode gap	Number of feet	Thickness
» ED-IDRE1-Pt	Ti/Pt	10 μm	10 μm	45 pairs	50/150 nm
» ED-IDRE2-Pt	Ti/Pt	10 μm	5 μm	60 pairs	50/150 nm
» ED-IDRE3-Pt	Ti/Pt	5 μm	5 μm	90 pairs	50/150 nm
» ED-IDRE1-Au	Ti/Au	10 μm	10 μm	45 pairs	50/150 nm
» ED-IDRE2-Au	Ti/Au	10 μm	5 μm	60 pairs	50/150 nm
» ED-IDRE3-Au	Ti/Au	5 μm	5 μm	90 pairs	50/150 nm



### » IDRE approach (2)

Reference	Material	μElectrode width	μElectrode gap	Number of feet	Thickness
» ED-IDRE4-Pt	Ti/Pt	10 μm	10 μm	45 pairs	50/150 nm
» ED-IDRE5-Pt	Ti/Pt	10 μm	5 μm	60 pairs	50/150 nm
» ED-IDRE6-Pt	Ti/Pt	5 μm	5 μm	90 pairs	50/150 nm
» ED-IDRE4-Au	Ti/Au	10 μm	10 μm	45 pairs	50/150 nm
» ED-IDRE5-Au	Ti/Au	10 μm	5 μm	60 pairs	50/150 nm
» ED-IDRE6-Au	Ti/Au	5 μm	5 μm	90 pairs	50/150 nm

IDRE sensors are compatible with standard electrochemical platforms (Drop- & AID-cell)



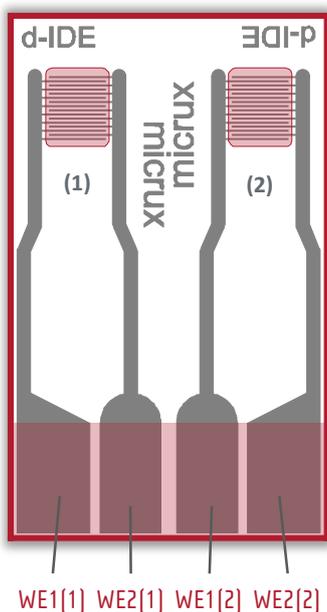
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## » Dual Interdigitated Lineal Electrodes

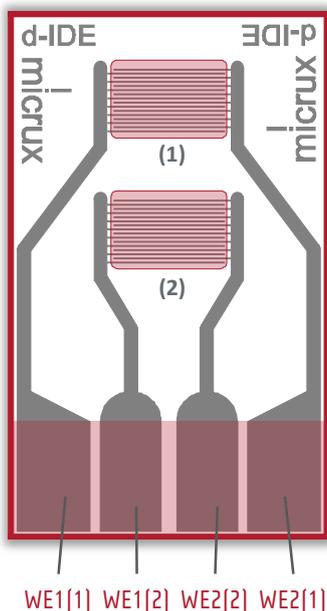
Dual interdigitated lineal-band electrodes can be integrated in a single chip with different configurations.

» External dimensions:	10 x 6 x 0.7 mm
» Substrate:	Glass
» Protective layer:	SU-8 resin
» Electrochemical cells:	1.2 x 1.5 mm (1) // 2.2 x 1.5 mm (2)



### » Dual-IDE approach (1)

Reference	Material	$\mu$ Electrode width	$\mu$ Electrode gap	Number of feet per cell	Thickness
» ED-dIDE1-Pt	Ti/Pt	10 $\mu$ m	10 $\mu$ m	30 pairs	50/150 nm
» ED-dIDE2-Pt	Ti/Pt	10 $\mu$ m	5 $\mu$ m	40 pairs	50/150 nm
» ED-dIDE3-Pt	Ti/Pt	5 $\mu$ m	5 $\mu$ m	60 pairs	50/150 nm
» ED-dIDE1-Au	Ti/Au	10 $\mu$ m	10 $\mu$ m	30 pairs	50/150 nm
» ED-dIDE2-Au	Ti/Au	10 $\mu$ m	5 $\mu$ m	40 pairs	50/150 nm
» ED-dIDE3-Au	Ti/Au	5 $\mu$ m	5 $\mu$ m	60 pairs	50/150 nm



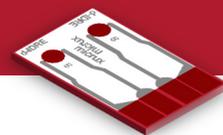
### » Dual-IDE approach (2)

Reference	Material	$\mu$ Electrode width	$\mu$ Electrode gap	Number of feet per cell	Thickness
» ED-dIDE4-Pt	Ti/Pt	10 $\mu$ m	10 $\mu$ m	30 pairs	50/150 nm
» ED-dIDE5-Pt	Ti/Pt	10 $\mu$ m	5 $\mu$ m	40 pairs	50/150 nm
» ED-dIDE6-Pt	Ti/Pt	5 $\mu$ m	5 $\mu$ m	60 pairs	50/150 nm
» ED-dIDE4-Au	Ti/Au	10 $\mu$ m	10 $\mu$ m	30 pairs	50/150 nm
» ED-dIDE5-Au	Ti/Au	10 $\mu$ m	5 $\mu$ m	40 pairs	50/150 nm
» ED-dIDE6-Au	Ti/Au	5 $\mu$ m	5 $\mu$ m	60 pairs	50/150 nm

Dual-IDE sensors are compatible with standard electrochemical platforms (Drop- & AIO-cell)



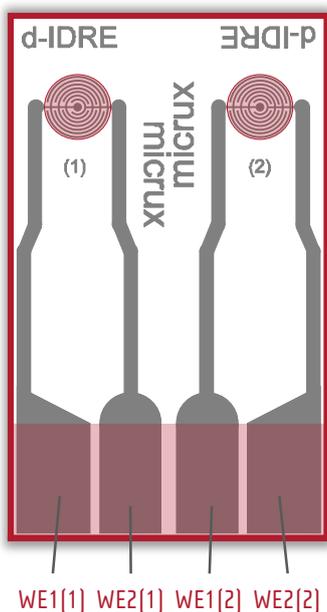
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## » Dual Interdigitated Ring Electrodes

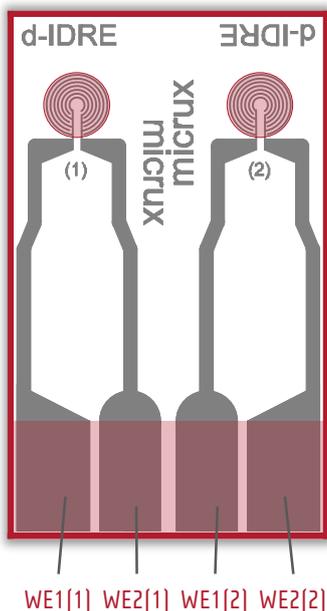
Dual interdigitated ring electrodes can be also integrated in a single chip with different configurations.

» External dimensions:	10 x 6 x 0.7 mm
» Substrate:	Glass
» Protective layer:	SU-8 resin
» Electrochemical cells:	1.25 mm Ø



### » Dual-IDRE approach (1)

Reference	Material	µElectrode width	µElectrode gap	Number of feet per cell	Thickness
» ED-dIDRE1-Pt	Ti/Pt	10 µm	10 µm	15 pairs	50/150 nm
» ED-dIDRE2-Pt	Ti/Pt	10 µm	5 µm	20 pairs	50/150 nm
» ED-dIDRE3-Pt	Ti/Pt	5 µm	5 µm	30 pairs	50/150 nm
» ED-dIDRE1-Au	Ti/Au	10 µm	10 µm	15 pairs	50/150 nm
» ED-dIDRE2-Au	Ti/Au	10 µm	5 µm	20 pairs	50/150 nm
» ED-dIDRE3-Au	Ti/Au	5 µm	5 µm	30 pairs	50/150 nm



### » Dual-IDRE approach (2)

Reference	Material	µElectrode width	µElectrode gap	Number of feet per cell	Thickness
» ED-dIDRE4-Pt	Ti/Pt	10 µm	10 µm	15 pairs	50/150 nm
» ED-dIDRE5-Pt	Ti/Pt	10 µm	5 µm	20 pairs	50/150 nm
» ED-dIDRE6-Pt	Ti/Pt	5 µm	5 µm	30 pairs	50/150 nm
» ED-dIDRE4-Au	Ti/Au	10 µm	10 µm	15 pairs	50/150 nm
» ED-dIDRE5-Au	Ti/Au	10 µm	5 µm	20 pairs	50/150 nm
» ED-dIDRE6-Au	Ti/Au	5 µm	5 µm	30 pairs	50/150 nm

Dual-IDRE sensors are compatible with standard electrochemical platforms (Drop- & AIO-cell)



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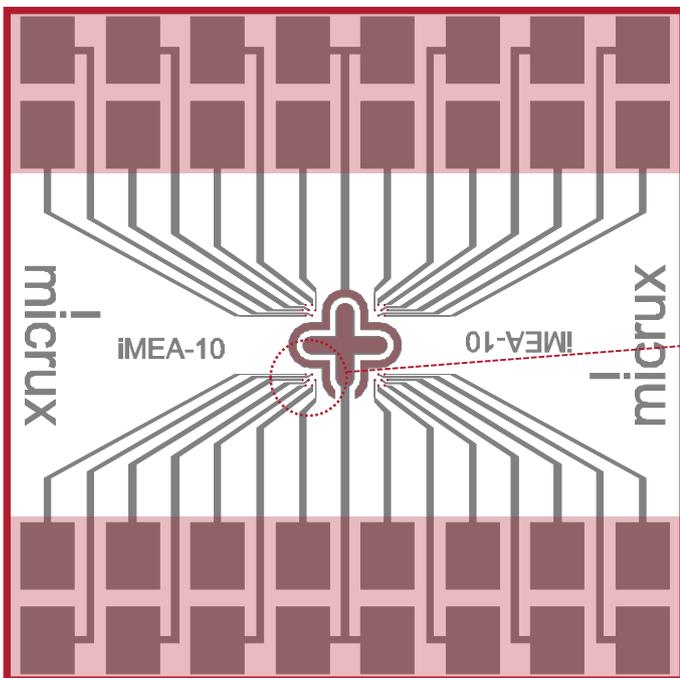


## » Individually Addressable MicroElectrode Arrays

Thin-film technologies enable the manufacture of different individually addressable multi-electrode array (iMEA) systems.

### » iMEA chip

iMEA chip consists of four sets of seven 10- $\mu\text{m}$  microelectrodes (28 individually addressable microelectrodes) with integrated reference and auxiliary electrodes in the center of the chip.



- » External dimensions: 10 x 10 x 0.7 mm
- » Substrate: Glass
- » Protective layer: SU-8 resin
- » Electrode material: Platinum or Gold

Reference	Material	Microelectrodes			Thickness
		Diameter	Pitch	Number	
» ED-iMEA-10-Pt	Ti/Pt	10 $\mu\text{m}$	100 $\mu\text{m}$	4x7	50/150 nm
» ED-iMEA-10-Au	Ti/Au	10 $\mu\text{m}$	100 $\mu\text{m}$	4x7	50/150 nm

*Custom-made accessories can be developed for using these specific microelectrode chips.*

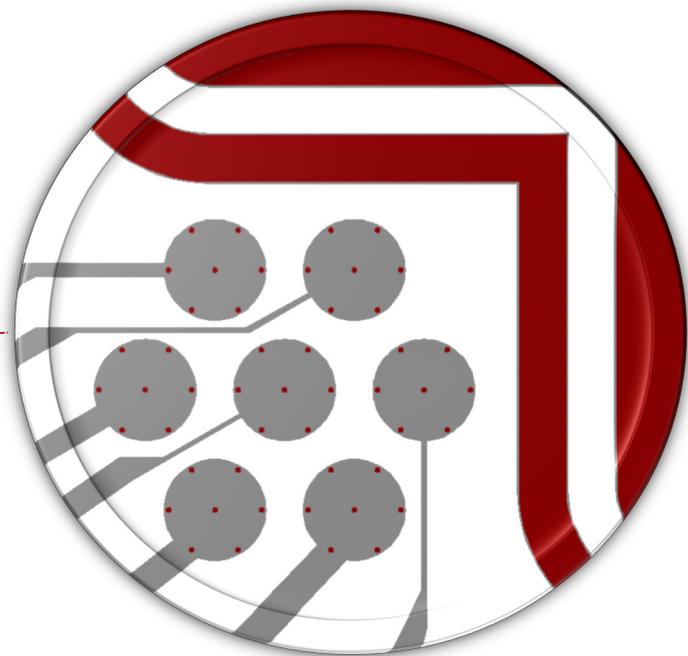
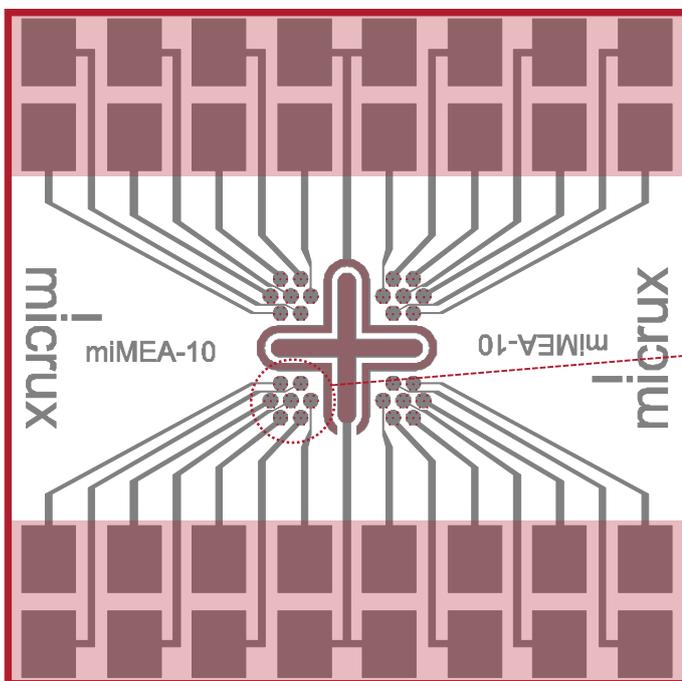


## » Individually Addressable MicroElectrode Arrays

Thin-film technologies enable the manufacture of different individually addressable multi-electrode array (iMEA) systems.

### » multi-iMEA chip

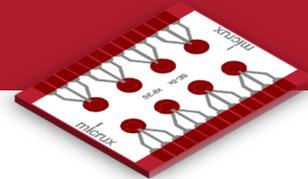
Multi-iMEA chip consists of four areas with seven sets of seven 10- $\mu\text{m}$  microhole arrays (28 individually addressable microelectrode arrays) with integrated reference and auxiliary electrodes in the center of the chip.



- » External dimensions: 10 x 10 x 0.7 mm
- » Substrate: Glass
- » Protective layer: SU-8 resin
- » Electrode material: Platinum or Gold

Reference	Material	Microelectrodes			Thickness
		Diameter	Pitch	Number	
» ED-miMEA-10-Pt	Ti/Pt	10 $\mu\text{m}$	100 $\mu\text{m}$	4x{7x7}	50/150 nm
» ED-miMEA-10-Au	Ti/Au	10 $\mu\text{m}$	100 $\mu\text{m}$	4x{7x7}	50/150 nm

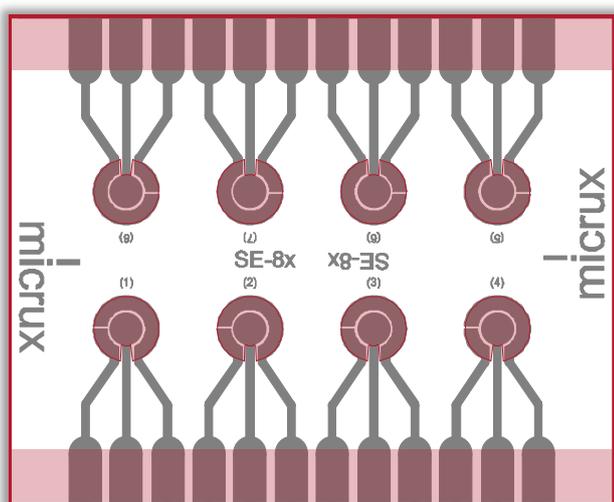
*Custom-made accessories can be developed for using these specific microelectrode chips.*



## » Multi-Electrodes Chips

Thin-film technologies enable the integration of multiple electrochemical cells in a single chip for multiplexing detection.

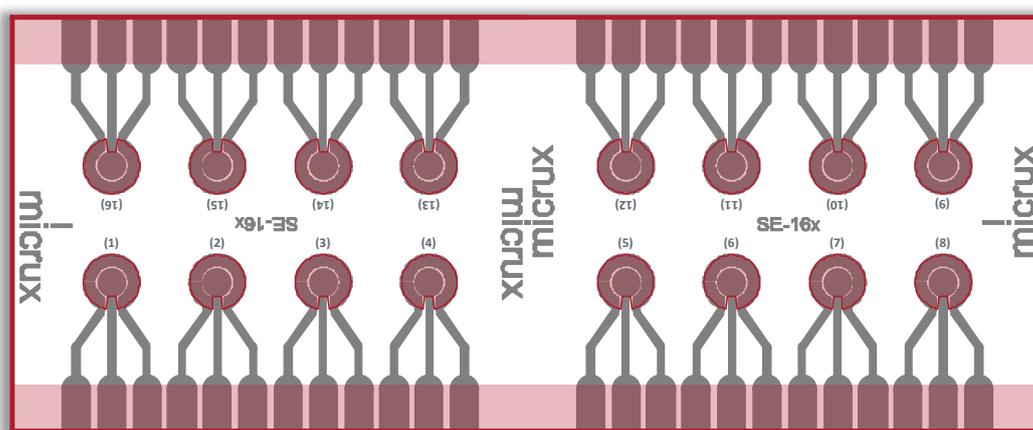
### » 8x single-electrode chip



- » External dimensions: 18.5 x 15 x 0.7 mm
- » Substrate: Glass
- » Protective layer: SU-8 resin
- » Electrochemical cells: 2 mm  $\varnothing$
- » Electrode material: Platinum or Gold

Reference	Material	WE area	Thickness
» ED-SE-8x-Pt	Ti/Pt	0.8 mm <sup>2</sup>	50/150 nm
» ED-SE-8x-Au	Ti/Au	0.8 mm <sup>2</sup>	50/150 nm

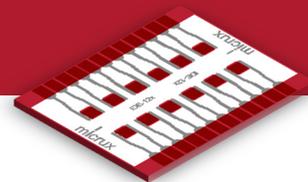
### » 16x single-electrode chip



- » External dimensions: 37 x 15 x 0.7 mm
- » Substrate: Glass
- » Protective layer: SU-8 resin
- » Electrochemical cells: 2 mm  $\varnothing$
- » Electrode material: Platinum or Gold

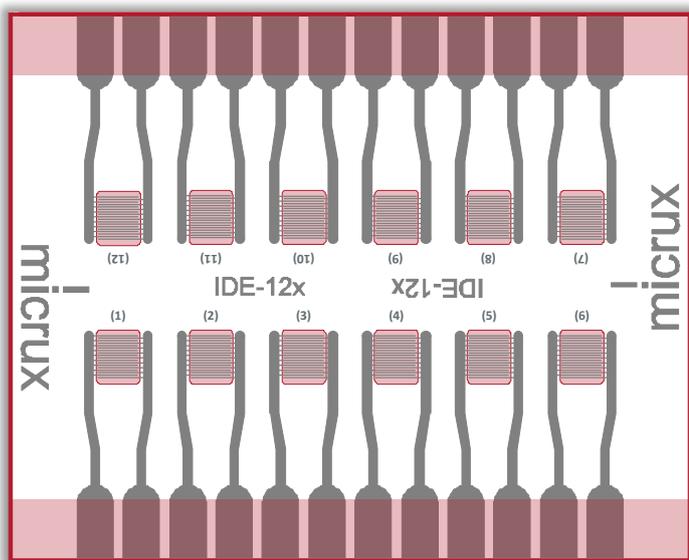
Reference	Material	WE area	Thickness
» ED-SE-16x-Pt	Ti/Pt	0.8 mm <sup>2</sup>	50/150 nm
» ED-SE-16x-Au	Ti/Au	0.8 mm <sup>2</sup>	50/150 nm

Custom-made accessories can be developed for using these specific multi-electrode chips.



## » Multi Interdigitated Electrodes Chips

Thin-film technologies also enable the integration of multiple cells with interdigitated electrodes in a single chip for multiplexing detection.



- » External dimensions: 18.5 x 15 x 0.7 mm
- » Substrate: Glass
- » Protective layer: SU-8 resin
- » Electrochemical cells: 1.2 x 1.5 mm
- » Electrode material: Platinum or Gold

Reference	Material	$\mu$ Electrode width	$\mu$ Electrode gap	Number of feet per cell	Thickness
» ED-IDE10-12x-Pt	Ti/Pt	10 $\mu$ m	10 $\mu$ m	30 pairs	50/150 nm
» ED-IDE5-12x-Pt	Ti/Pt	5 $\mu$ m	5 $\mu$ m	60 pairs	50/150 nm
» ED-IDE10-12x-Au	Ti/Au	10 $\mu$ m	10 $\mu$ m	30 pairs	50/150 nm
» ED-IDE5-12x-Au	Ti/Au	5 $\mu$ m	5 $\mu$ m	60 pairs	50/150 nm

*Custom-made accessories can be developed for using these specific multi-electrode chips.*

## » Other thin-film (micro)electrodes

Thin-film technologies open the gate to the manufacture of other different customized (micro)electrode designs with a low-cost, high precision and resolution. Thus, other chips including multiple single-electrodes or interdigitated electrodes (lineal or ring) can be also accomplished.

**:::Request your own electrochemical sensor:::**





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