

# DATASHEET

## °AirRay Electrodes

CorTec °AirRay electrodes based on the °AirRay electrode technology are capable of recording and stimulating brain activity. Produced in a proprietary laser manufacturing process, °AirRay electrodes are very soft, thin and flexible.

KEY WINNING FEATURES

### High Precision

Ultra-short pulse laser micromachining allows for feature sizes of down to 25µm at highest reproducibility

### Adaptation of Shape and Functionality

Modification of electrodes to build 3-dimensional assemblies as well as nerve cuff electrodes or integrating microfluidic channels for drug delivery

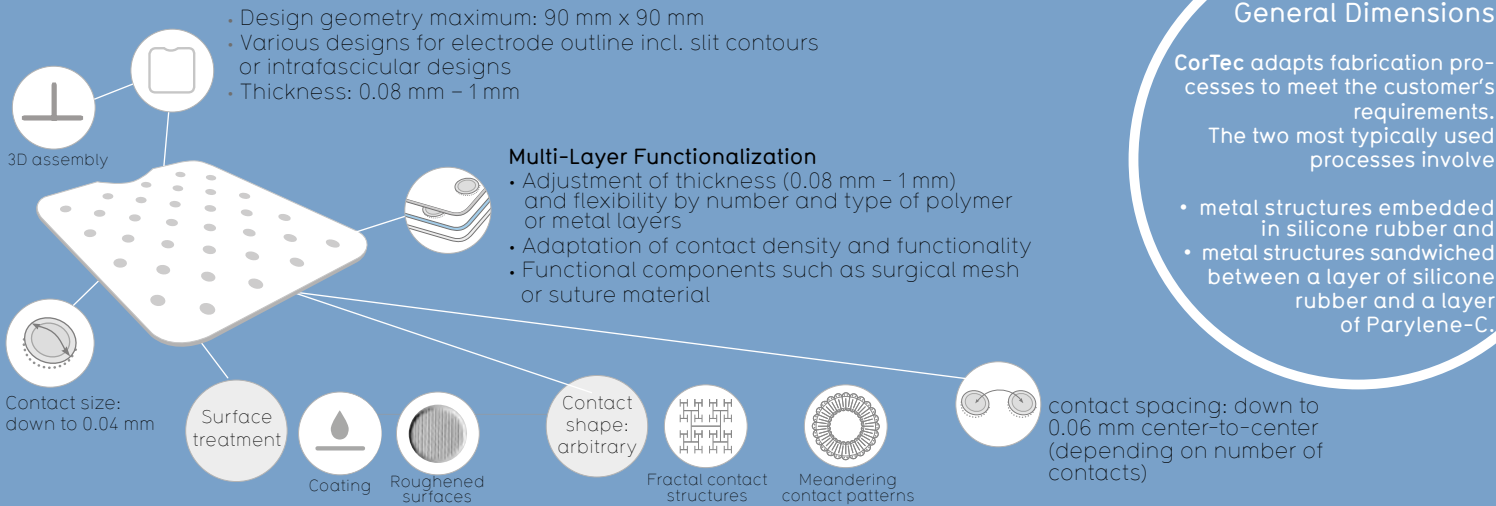
### Easy Adjustment of Mechanical Properties

Varying the thickness of silicone, Parylene-C, or metal layers creates softer or harder electrode structures

### Excellent Electrochemical Properties

Apart from Platinum-Iridium other materials are available upon request including high performance coatings or roughened structures for improving charge injection capacity

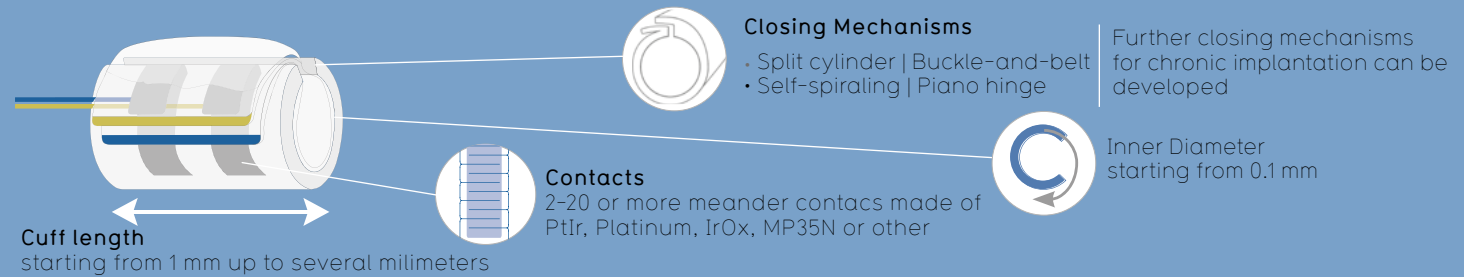
DESIGN OPTIONS



### General Dimensions

CorTec adapts fabrication processes to meet the customer's requirements. The two most typically used processes involve

- metal structures embedded in silicone rubber and
- metal structures sandwiched between a layer of silicone rubber and a layer of Parylene-C.



PERFORMANCE

	Charge Injection Capacity	Typical Impedance <sup>1</sup> (Diameter 1 mm)		Typical Impedance <sup>1</sup> (Diameter 2.7 mm)	
		10 Hz	1 KHz	10 Hz	1 KHz
MP35N	max. 0.03 mC/cm <sup>2</sup> <sup>4</sup>	260 kΩ	5 kΩ	32 kΩ	0.6 kΩ
Platinum-Iridium (90/10)	0.06 mC/cm <sup>2</sup> <sup>2</sup>	47 kΩ	1 kΩ	8 kΩ	0.2 kΩ
Platinum	0.05 mC/cm <sup>2</sup> <sup>3</sup>				
Platinum Black	0.25 mC/cm <sup>2</sup> <sup>5</sup>				
Rough Platinum-Iridium (laser-treated)	0.27 mC/cm <sup>2</sup> <sup>6</sup>				
Sputtered Iridium Oxide Film (SIROF)	0.70 mC/cm <sup>2</sup> <sup>7</sup>				

1 Setup: three electrode configurations in 0.9% saline. Typical impedance readings.  
2 Cogan et al.: In Vitro Comparison of the Charge-Injection Limits of Activated Iridium Oxide (AIROF) and Platinum-Iridium Microelectrodes, 2005.  
3 Rose et al.: Electrical stimulation with Pt electrodes, 1990.  
4 Ning et al.: Pitting Corrosion of High Strength Alloy Stimulation Electrodes under Dynamic Conditions, 1989.  
5 Own investigations.  
6 Own Investigations.  
7 Own investigations, matching Cogan et al.: Sputtered iridium oxide films (SIROFs) for low-impedance neural stimulation and recording electrodes, 2004.

MATERIALS

### POLYMERS

- Medical grade silicone rubber
- Long-term (> 30 days)
  - Short-term (< 30 days)
- Parylene-C

### METALS

- Medical grade metal alloys:
- Platinum-Iridium (90/10)
  - Platinum
  - MP35N
  - Stainless Steel
  - Gold

- High-performance coatings:
- Sputtered Iridium Oxide (SIROF)
  - Platinum Black

Physical surface modification like laser roughening permits additional adaptations to the individual application.