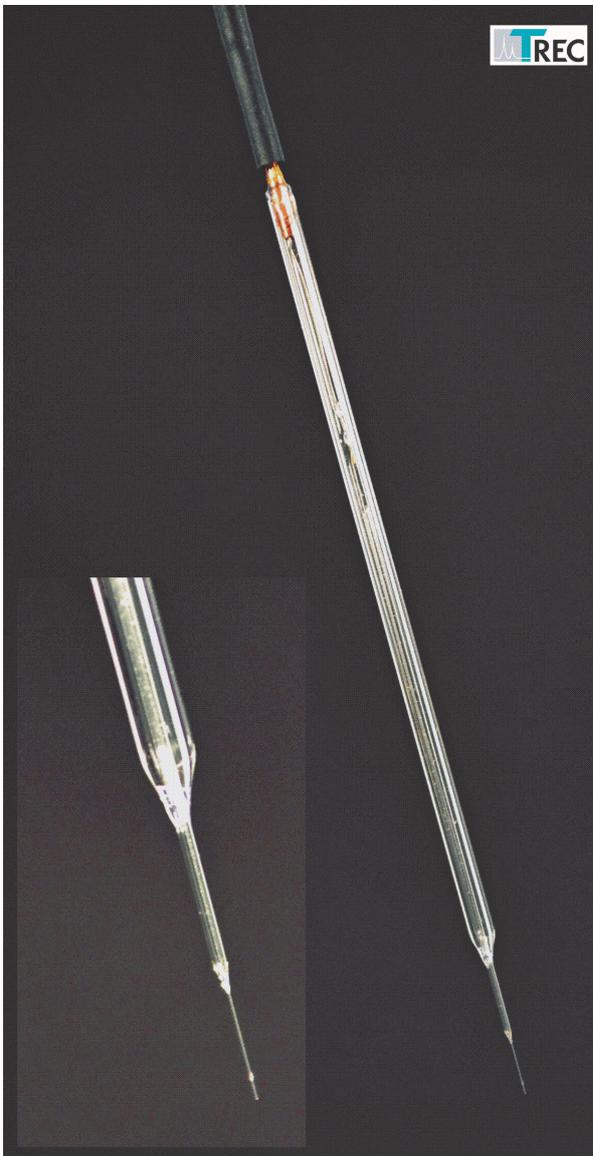




Thomas RECORDING GmbH
Electrochemical Division

Microelectrodes for electrochemical Applications



- **Material:** quartz glass insulated platinum or platinum/tungsten
- **Unique manufacturing technique** offers high reproducibility of tip geometry
- **Tip geometry:** highly centered metal core
- **Signal quality:** very good signal to noise ratio
- **Quartz glass** offers better electrical characteristics as borosilicate glass
- **Tip shape:** different tip shapes available with tip diameters in the μm range

and many products more...

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GERMANY

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ISO 9001  TÜV Rheinland®
Precisely Right

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Innovative Products for Electrochemistry

Thomas Disc Microelectrodes

Thomas RECORDING electrochemical disc microelectrodes were originally designed for SECM (Scanning ElectroChemical Microscopy), but they are also suitable as working electrodes for other electrochemical applications like voltammetry or amperometry.

The electrodes are based on **unique single metal core fibers** of platinum or platinum/tungsten alloy, insulated with quartz glass.

A **special manufacturing process** guarantees a highly centered metal core within the glass insulation and a high reproducibility of the RG ratio.

Compared to widely used borosilicate glass, quartz glass is a much better insulator with a **lower loss factor** (0,0038 for quartz glass, app. 0,58 for borosilicate glass). Quartz glass insulated electrodes have lower electrical background noise and therefore a **better signal to noise ratio**. Figure 2 demonstrates the performance of Thomas RECORDING electrochemical microelectrodes. This Cyclic voltammogram was recorded with a 10 μm platinum electrode (RG 10) in aqueous solution of 1 mmol/l ferrocenemethanol.

Every electrode produced by Thomas RECORDING is microscopically controlled and tested by cyclic voltammetry. The test results for each electrode are documented by test certificates enclosed to your shipment. The electrochemical active diameter is determined for **every individual electrode** by measuring the diffusion limiting current.

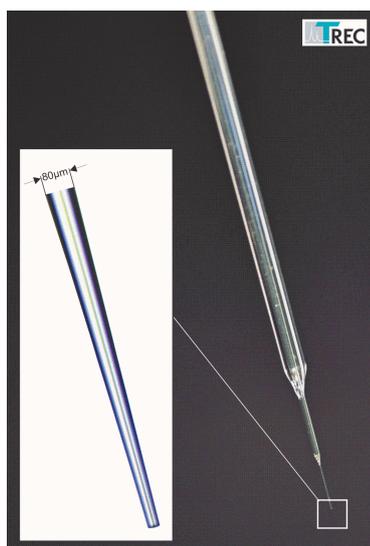


Figure 1: Electrochemical electrode tip. Different tip shapes are available

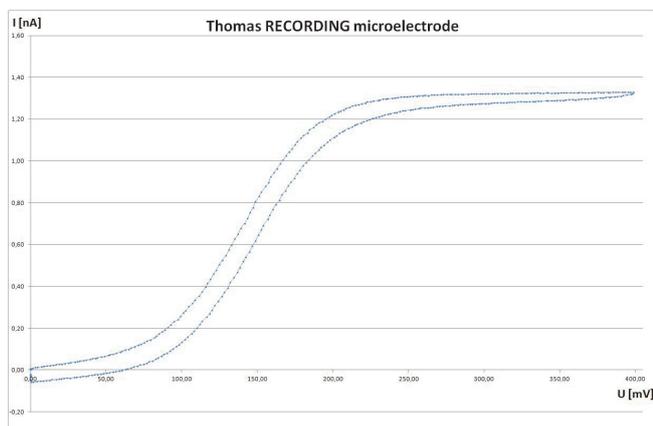


Figure 2: This cyclic voltammogram was recorded with a 10 μm platinum electrode (RG 10) in aqueous solution of 1 mmol/l ferrocenemethanol. Support electrolyte 0,1mol/l KCl, reference electrode Ag/AgCl, measurement speed 100mV/s, recording unit: HEKA PG310 potentiostat

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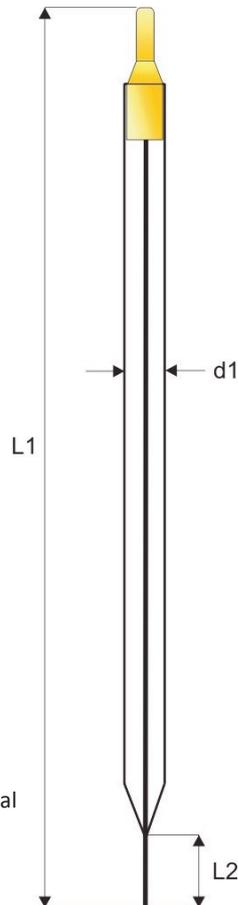


Figure 3: Electrochemical electrode dimensions

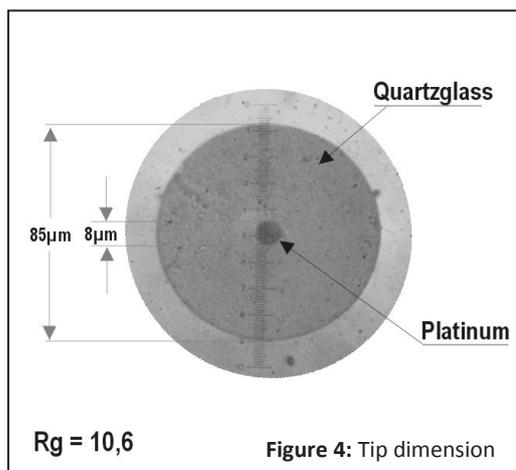


Figure 4: Tip dimension

Technical Data

The hull of Thomas electrochemical microelectrodes consist of an outer glass tube with $d1 = 2\text{mm}$ for **high durability** and an inner guide tube of $d2 = 0.5\text{mm}$ for **improved centering** of the quartz glass insulated electrode fiber. The standard total length of the electrode $L1$ is 80mm , the fiber protrusion from the inner tube $L3$ is normally 5mm . For individual applications, feel free to contact us for custom adaptations of the lengths.

Electrode Specifications:

Dimensions (see figure 3):

L1: Standard is 80mm , custom adaption possible

L2: Standard is 5mm , custom adaption possible

d1: $2,0\text{mm}$

Connector: gold plated male pin, 0.8mm .

Matching female connector available from Thomas RECORDING.

The most common tip shape for electrochemical electrodes is the disk type. Thomas RECORDING offers disk type electrodes which are ground and polished to **mirror finish** (see figure 4).

Custom made electrodes are available on request!

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Thomas Disc Microelectrodes

Thomas RECORDING offers microelectrodes with RG ratios of 3 and 10. Our standard sizes are listed in table 1. In-between sizes are also possible, please feel free to ask for your individual design.

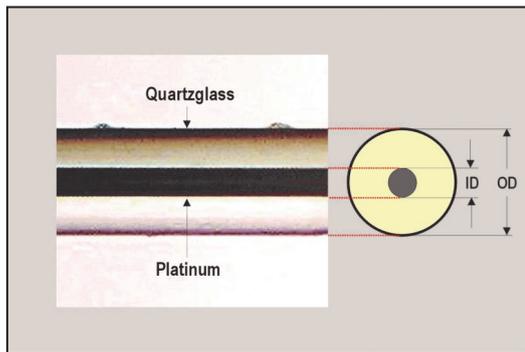


Figure 5: RG ratio of electrochemical electrode tips

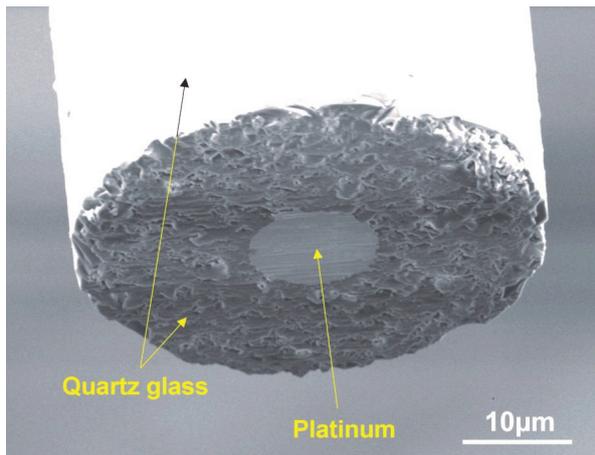


Figure 6: Scanning electron microscope photo of electrochemical electrode tip

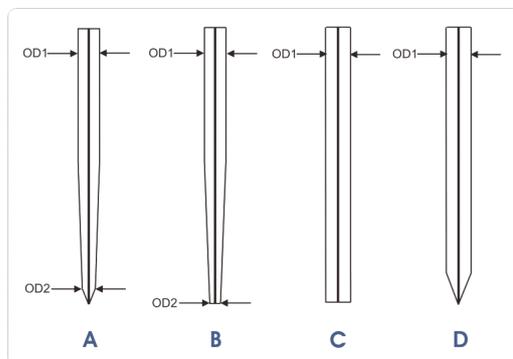


Figure 7: Electrochemical electrode tip shapes

Table 1: Article numbers, tip diameters and RG ratios

Article number	Tip Diameter [µm]	RG ratios
AN0000419	25	3,10
AN0000556	10	3,10
AN0000557	5	3,10
AN0000558	1	10

Table 2: Available tip shapes

Tip shape	Description
A	Pulled & ground, double conical
B	Pulled & ground, disc type
C	Only ground, disc type
D	Only ground, conical

The available tip shapes are shown in figure 5 and listed in table 2.

Additionally, we provide needle type electrodes, suitable for penetration and measurements of **organic tissue**, for example. Please select the tip shape required for your experiment from Figure 5 and table 2.