Fraunhofer IPMS

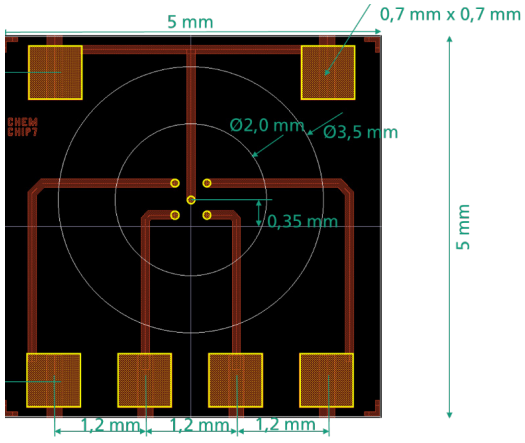
Electrochemical analysis chip 7 + 8: chip level measurement

The measuring adapter can directly accommodate and contact an electrochemical analytical chip

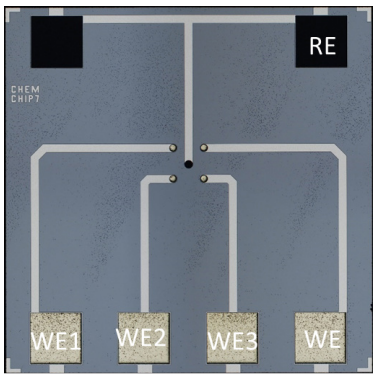
Two new layouts have been implemented at Fraunhofer IPMS for electrochemical analysis. The chip size is 5 x 5 mm² in each case. The chips have well-defined gold electrodes and one silver electrode each, which can be subsequently chlorinated to be used as a reference electrode. The chips are designed to be used with the Fraunhofer IPMS measurement adapter (see above), which contacts the electrodes via gold pins and can be connected directly to a potentiostat.

Chip description electrochemical analytical chip 7

The analytical chip 7 consists of 4 gold electrodes and a silver electrode arranged in the center (see above). The electrodes have a diameter of approx. 107 µm. Each electrode can be connected individually via a 700 x 700 µm contact pad.



Chip layout and bond pad grid, valid for chips 7 and 8



Microscope image of the electrochemical analytical chip 7

Contact

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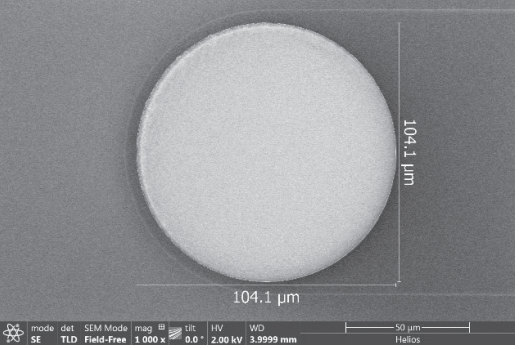
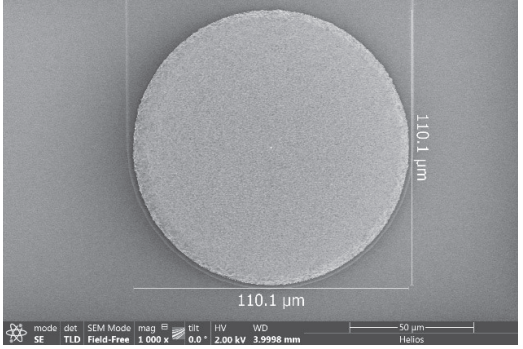
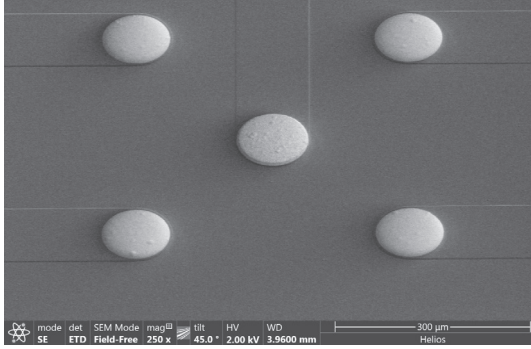


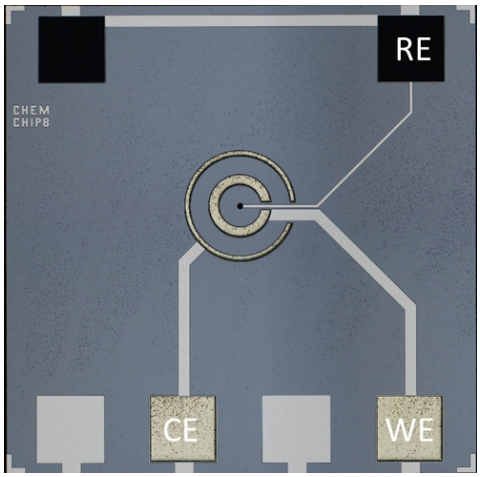




SEM images of a micro gold electrode (left) and a micro silver electrode (center)
Right: SEM image of the electrode structures with the silver electrode in the center surrounded by 4 gold electrodes

Chip description electrochemical analytical chip 8

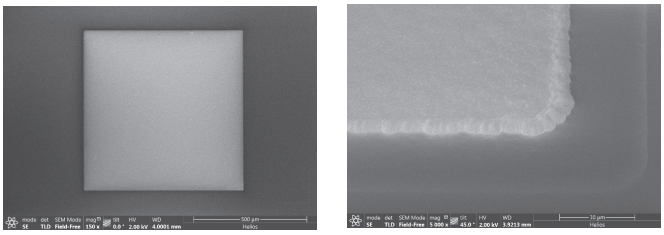
Analytical chip 8, shown above left and center, has a three-electrode arrangement with a centered small silver electrode (1 960 µm²) that can be used as a reference electrode, a gold working electrode (181 000 µm²), and a counter electrode (181 000 µm²) also made of gold.



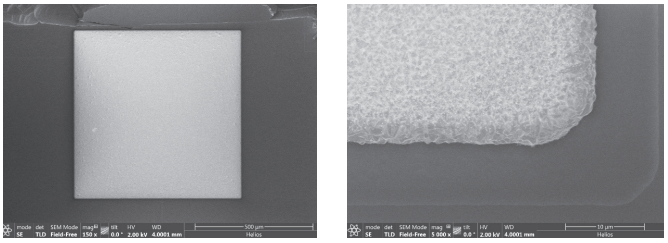
Microscope image of the electrochemical analytical chip 8

Contact pads of the chips

With a size of 0.7 x 0.7 mm² each, the contact pads of chip 7 and 8 are large enough to be contacted with a needle adapter or even small, back-insulated crocodile clips.



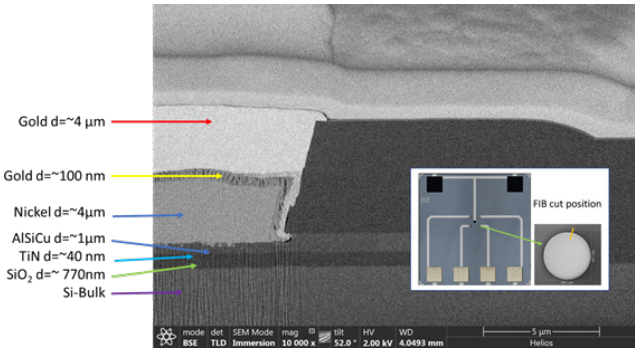
SEM image of a gold contact pad, on the left in the overview, right a section of a pad corner

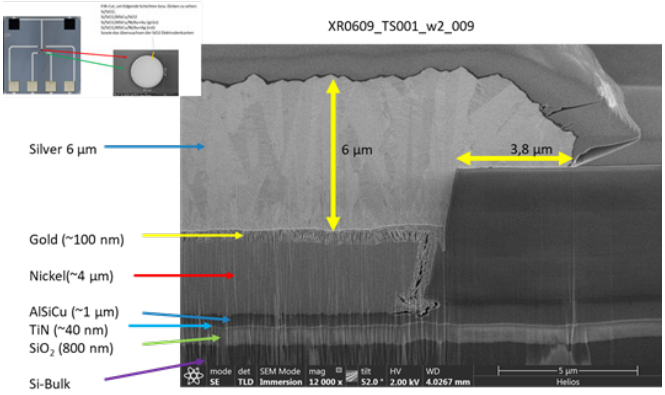


SEM image of a silver contact pad, on the left in the overview, right a section of a pad corner

SEM: FIB cut

To avoid penetration of the measuring solution at the electrode edges, electrodes are designed to overlap the edge. In the example shown in Fig. 1, for example, this is 3.8 µm. The extent of the overlap can be adjusted.





Left: SEM FIB cut of a gold electrode.
Right: SEM FIB cut of a silver electrode