

Plastics for Medical Devices

Laser MID Technologies

Laser MID technologies can offer high potential for innovative plastic products in medical technology due to their requirements of electrical functionality on 3D shaped devices.

Disposables can minimize the infection risk in high frequency surgery. One example for such a disposable is a bipolar plastic tweezers with an integrated temperature sensor for controlled coagulation of human tissue. With small conductor lines which act as a temperature sensor the temperature of the tissue during surgery can be monitored. If the temperature gets too high, the high frequency current is automatically switched off. Furthermore due to the better isolation unwanted damage of the human tissue is avoided. The disposable tweezers can be fabricated by Laser Direct Structuring (LDS) technology. Plastics with enhanced temperature stability are available for this application. The electrode area on the tweezers as well as the conductor lines to the electrodes need a comparatively large layer thickness of the metal due to the required current capability. In this case, after deposition of a starting layer of electroless copper on the laser activated areas electroplating was applied to get a large metal layer thickness. Furthermore very smooth metal surfaces can be obtained by electroplating to avoid sticking tissue during surgery. The conductor lines necessary for the temperature sensor are generated by electroless plating only because only thin metal layers with high resistances are required.

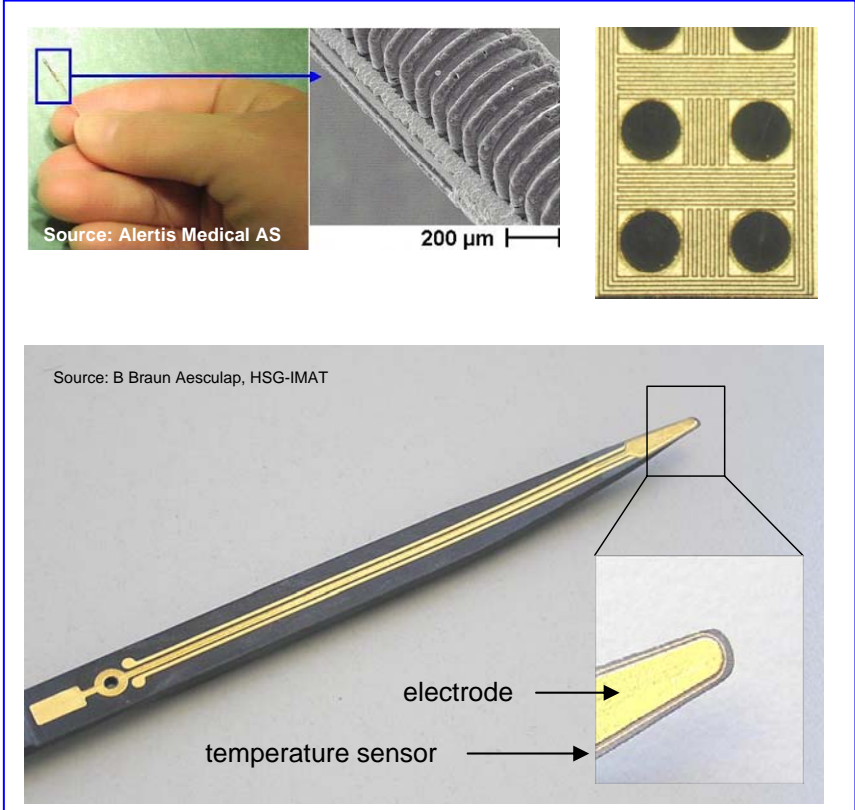
A further application for laser based MID in medical technology is a micro sensor for detection of the partial pressure of carbon dioxide in human tissue. This is important for detection of ischaemia, i.e. pathological reduced blood circulation due to lowered arterial blood supply. The micro sensor has a length of 9 mm and a diameter of 0.6 mm and

Molded Interconnect Devices (MID)

- Higher functionality
- Higher level of integration
- Reduction of cost
- Reduction of weight
- Smaller package size

Applications

- Micro sensor for detection of ischaemia
- Touch sensor for Braille module
- Bipolar tweezers for HF surgery



can be inserted in the tissue by a needle. First animal experiments with the sensor have been successful. Further experiments are in progress.

Braille display capable for internet access for blind people. With the touch sensor between the pins the mouse click function can be applied.

Laser MID technologies are also well suited to fabricate small structures for a touch sensor integrated in a Braille display module. Here several modules are assembled together to result in a