ACTive Implant for Optoacoustic Natural sound enhancement

SEVENTH FRAMEWORK PROGRAMME

Implantable Flexible Substrate

Implantable devices often rely on leads and electrodes to deliver electric stimulation to specific areas inside the body. Such applications include pacemakers, spinal cord stimulators for chronic pain treatment, deep brain stimulators and cochlear implants. These leads have to be both long-term biocompatible and mechanically robust to guarantee decades of uninterrupted operation. Retrieving and replacing broken leads is often an invasive surgical procedure.

Flexible substrate made of silicone and platinum with a length of 22 mm and a width of ~1 mm.

Device Design

CSEM and STMicroelectronics are developing novel miniature flexible substrates for medical implants. These are made exclusively from proven biocompatible materials. A first prototype (shown in above figure) is 22 mm long and 1 mm wide. It is made of implant-grade silicone and platinum and is suitable for long-term applications. The design guarantees out-of-plane flexibility while protecting the platinum lines from tensile stresses which may occur during implantation.

Fabrication relies on production steps which are either highly automatable or can be applied to batches. For example, the metal lines are laser cut from a platinum foil, allowing for high automation and simultaneous processing of tens or hundreds of devices. Manual intervention is reduced to a minimum. The processes are hence more reliable, which increases the yield in production.

Medical Requirements

Implantable flexible substrates or leads have to comply with regulations governing long-term implantable devices which are in contact with blood. It is therefore required to build the flexible substrates from materials with a proven track record in the medical implants industry (unless one wishes to go through extensive testing for new materials). There is a limited number of metals (e.g. platinum, titanium), ceramics (e.g. alumina, zirconia) and polymers (e.g. silicone, PTFE, PET) to choose from.

Other product requirements demand low impedance metal lines, mechanical robustness and high flexibility while protecting the metal lines from tensile stresses. Last, the manufacturing costs have to compete with state of the art leads used in implants.

For additional information, please contact info@action-project.eu or visit our website at www.action-project.eu

Project Partners

MED-EL, CSEM SA, Medizinische Hochschule Hannover, Teknologian tutkimuskeskus VTT Oy, SUSS MicroOptics SA, VERTILAS GmbH, STMicroelectronics

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