**High Resolution FIB-Nanotomography of biological cell tissue and investigation of interfaces between tissue and biocompatible materials**

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To investigate the embedding of implants into bone tissue and connective tissue, or the coupling of recording or stimulation electrodes to neural tissue, the precise knowledge of the interface (structure, chemical composition, internal layers, etc.) between cell tissue and implant or electrode material is essential. In electro-physiology the exact knowledge of the interface between cell tissue and stimulation or recording electrodes contributes to the interpretation of the recorded signals. Furthermore the understanding of mechanisms influencing the behavior of cells on micro structured surfaces could help to optimize the surface of future implants.
The investigation of the interface between cell tissue and hard materials like silicon etc. is mostly limited to the investigation of epoxy replicas. This is due to the limitations of the ultramicrotomy technique for cutting hard materials like silicon, glass, ceramics etc.
Other, previously used, techniques allowing to investigate the real interface in the TEM are very time consuming and not very site specific.
To overcome the disadvantages of the microtome (only replicas can be investigated), we have developed a fast preparation technique that allows a site specific, high resolution investigation the real interface between silicon microstructures and cell tissue at high resolution in a CrossBeam (FIB / FESEM) instrument.
Due to the combination of a high resolution field emission SEM for superb imaging capabilities and a high resolution FIB for cutting this technique allows site specific preparation and high resolution investigation of the internal interface at the nm level. The CrossBeam instrument can also be used to do serial sectioning of the sample and provide three dimensional information of the sample at the nm scale.

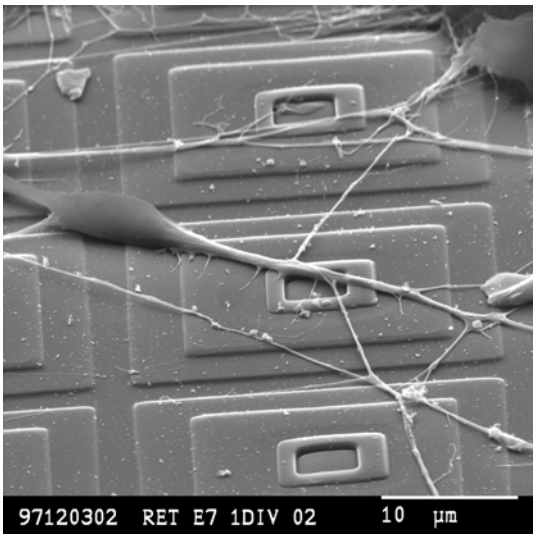

Fig 1: Neurons grown on a multi electrode array

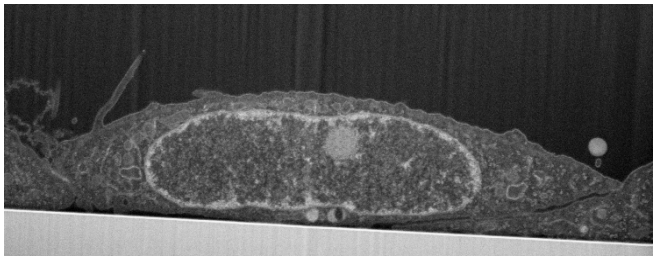
Fig 2: FIB Cross section through the interface cell tissue – semiconductor material