Implantable Electronics for Neural Stimulation and Recording

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Functional electrical stimulators are nowadays widely employed to restore functions to the neurologically impaired individuals. Cochlear implants, deep brain stimulators and the vision prosthesis are some of the prominent examples. Concurrently, neural recorders are developed for basic research as well as brain-machine-interfaces. Both implantable systems become increasingly challenging, if a large number of electrodes needs to be realized - space and power budget, safety issues as well as the number of electrical interfaces make the electronic circuit design a complex task of research and development.

Especially in the interaction with packaging, lifetime enhancement can be achieved with clever techniques.

This talk will highlight some of the recent advances towards the realization of multichannel neural stimulators as the retinal vision prosthesis, as well as extracellular neural recorders. Therefore, system requirements are outlined and the possible integrated realizations are discussed. Energy efficient power and data transfer will be discussed together with architectural and circuit ideas for the interfacing electronics.

An outlook will be given on multimodal neural interfaces as optical or magnetical stimulation.