

**JOINED EFFORT SOLARIS:  
VISUAL PROSTHESIS BY SELECTIVE STIMULATION OF THE OPTIC NERVE IN PATIENTS WITH  
RETINAL DISEASES.**

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Every year many people become blind because of retinal degenerative diseases (retinitis pigmentosa and macular degeneration) or retinal ablation. Research groups try to develop retinal implants (subretinally or epiretinally) to save a remaining vision or restore visual function. These projects use the retina for stimulation and a technical system transforming light stimuli into electrical signals. The SOLARIS-project also uses a technical system to transform light inputs into electrical stimuli, but we developed a specific dualselective scanner-electrode to stimulate the optic nerve, not the retina. This self-sizing electrode consists of two external ring-electrodes and 6 single-electrodes between the ring-electrodes. While stimulating the cat optic nerve with this electrode local field potentials (LFP's) were measured by electrodes within the ipsilateral visual cortex (area 18) and compared with computer model simulation. Trying to release LFP's in defined areas of the visual cortex by stimulating selectively nerve-fibres within the nerve, we tested the following parameters: threshold currents, intensity of current, frequency and duration of stimulation, different electrode configuration (bipolar and tripolar stimulation) and prepuls stimulation (submaximal stimulus, rectangle prepuls). Using different parameters a spatial and temporal selective stimulation not only of specific segments within the nerve but also of nerve-fibres with different diameter in these segments is possible. These findings are prerequisites for a microprocessor, analysing incoming pictures, transform them into different stimulation-parameters and activate the implanted scanner-electrode. This will stimulate optic nerve-fibres and induce a visual field consisting of perhaps 30-40 picture elements, enough for a rough orientation.